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Opinion Review

Anesthetists for the Future

There is a shortage of anesthetists. Everyone recognizes that fact and that something should be done about it. Some even go so far as to say that the answer is to be found in the training of anesthesia technicians. This would mean lowering standards of education. At the same time there is a trend towards raising the quantity and quality of education in the established hospital schools of anesthesia, a major step in this direction being the A.A.N.A. program for the accreditation of schools of anesthesia for nurses. And in addition there are outspoken supporters of courses in anesthesia leading to a degree as a means of attracting more nurses to the field and of giving recognition to the nurse who chooses anesthesia for postgraduate study.

In nursing, which faces the same problem of lack of personnel, the proposed solution aims at building up a force of technical assistants at one end of the scale and of degreed nurses at the other. This is the plan for nursing for the future.

Would a similar plan work for anesthesia for the future? What is in favor and what against the anesthesia technician? What can be said for the present system of training nurses as anesthetists in the hospital schools of anesthesia? What are the merits of degree programs for nurse anesthetists?

Since the composition of the ranks of anesthetists affects both those in and coming into the field, the Opinion Review section in this and future issues of the Journal will be devoted to a discussion of the anesthetist of the future. Contributions from A.A.N.A. members and other readers will be welcome.—Ed.

Several years ago I would have been pleased if the A.A.N.A. could have named one college or university that offered a degree in anesthesia. Unfortunately, it couldn't then, nor can it today. I had to make a choice of the degree program that would be most helpful. You might ask whether I can give a better anesthetic as a consequence of having a degree. Perhaps not. However, the science courses gave me

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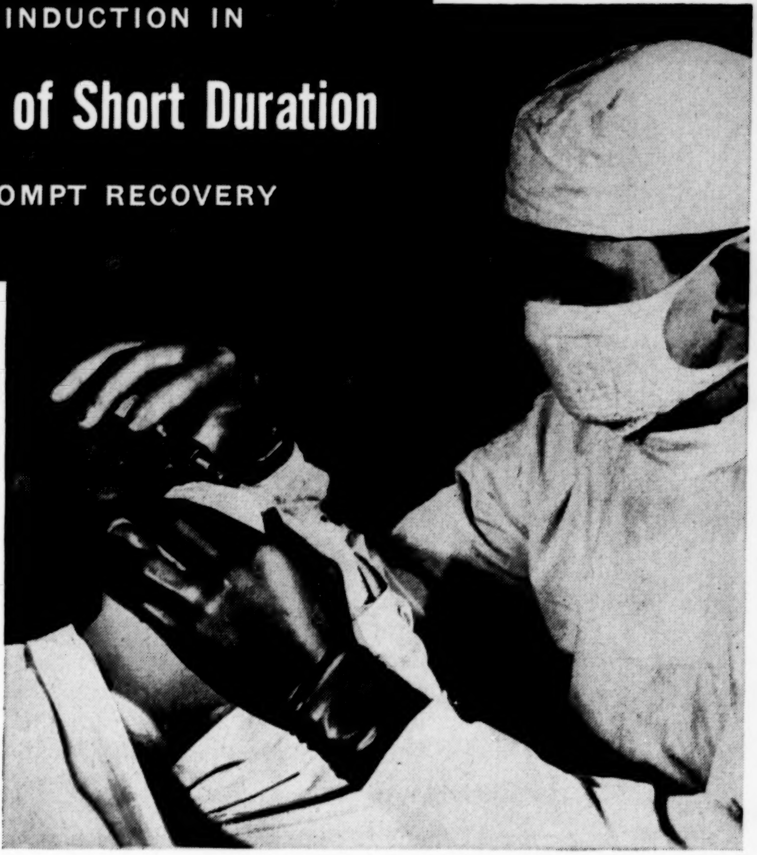

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a better understanding of the anesthetic agents and the changes they are capable of producing. In short, I can co-ordinate the "whys" and "wherefores" of statements I had previously accepted. Sociology, psychology, and other related courses gave me a better understanding of patients and co-workers. Most of all, working towards a degree recreated the desire to learn and better myself. I think perhaps I am a better anesthetist than I was before. Education *is* valuable.

We have been hearing about the possibility of training anesthesia technicians who are not necessarily nurses. This has been suggested to correct the present shortage of anesthetists. The first reaction is one of disapproval. Mine was. Then I thought it over. We might accomplish it with a four year course, by having two years of concentrated study to cover the curriculum and additional subjects necessary to prepare the student for the field of anesthesia, followed by a two year internship in a hospital approved by the A.A.N.A. Much time and thought by experienced personnel would be necessary to formulate this program. In my mind, I feel it could be done. However, where are the advantages? The individual would spend four years and then be a technician. We have spent four years and are now registered nurses as well as nurse anesthetists. Isn't the R.N. a valuable asset in itself as well as a basis for the course in anesthesia? —HELEN VOS, R.N., Hurley Hospital, Flint, Mich.

The many changes that are taking place in nursing today are of vital interest to nurse anesthetists. Since we are nurses before we are anesthetists, the question arises as to which nursing group the nurse anesthetist of the future is to come from. Will she be a degreed nurse, the three year—trained registered nurse, or a practical nurse?

Probably most of us will agree that the qualifications of a good nurse, and also those of a good nurse anesthetist, do not hinge on her educational background. These qualifications are the personality characteristics that we all recognize and know to be important, but we find ourselves bored and slightly embarrassed when we hear them enumerated. These characteristics must be native to the individual to some extent, but they are developed by training and experience, particularly early life experiences and, I believe, by the discipline of three years of training as a student nurse. Education certainly improves the competent well adjusted person, but education per se does not seem to develop the personality characteristics necessary to success in the practice of anesthesia.

Again, from which group of nurses is the nurse anesthetist of the future to come? Most of us, as nurse anesthetists, have felt the need for a better background in the basic sciences, but we have supplemented our nursing school studies by reading and discussion until we have

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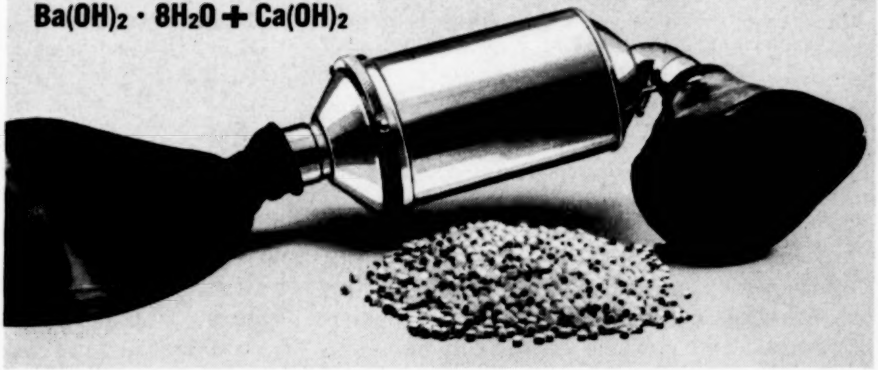

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secured a fairly satisfactory orientation to the things we see happening in our daily work. On this basis alone the practical nurse should be eliminated from our considerations. But there is more to be said. Professional training, which it is hoped develops the personality characteristics mentioned previously, is lacking in her experience, and this lack even more definitely excludes her from the ranks of the nurse anesthetist. No need, however great, for increasing our numbers should ever drive us to accept candidates of less education and training than the three year—trained registered nurse. To do so would lower our standards and the position that we have for years striven to attain and that we are even now seeking to improve.

As to the degreed nurse, we are certainly proud that we have among our numbers some degreed nurses, and we hope that we will have more. But the three year—trained registered nurse has made considerable progress in the field of anesthesia, and it is likely that for some time the majority of nurse anesthetists will come from this group. We should encourage education and strive for higher educational standards, but we must also be practical. We must maintain a competent body of professional workers reasonably adequate in numbers to take care of the demand. If we were to draw only from the degreed nurses, the number entering the field would be so small our ranks would rapidly be depleted. We must advance from where we are, keeping in mind that we need more and better nurse anesthetists.—OPAL SCHRAM, R.N., Wesley Memorial Hospital, Chicago.

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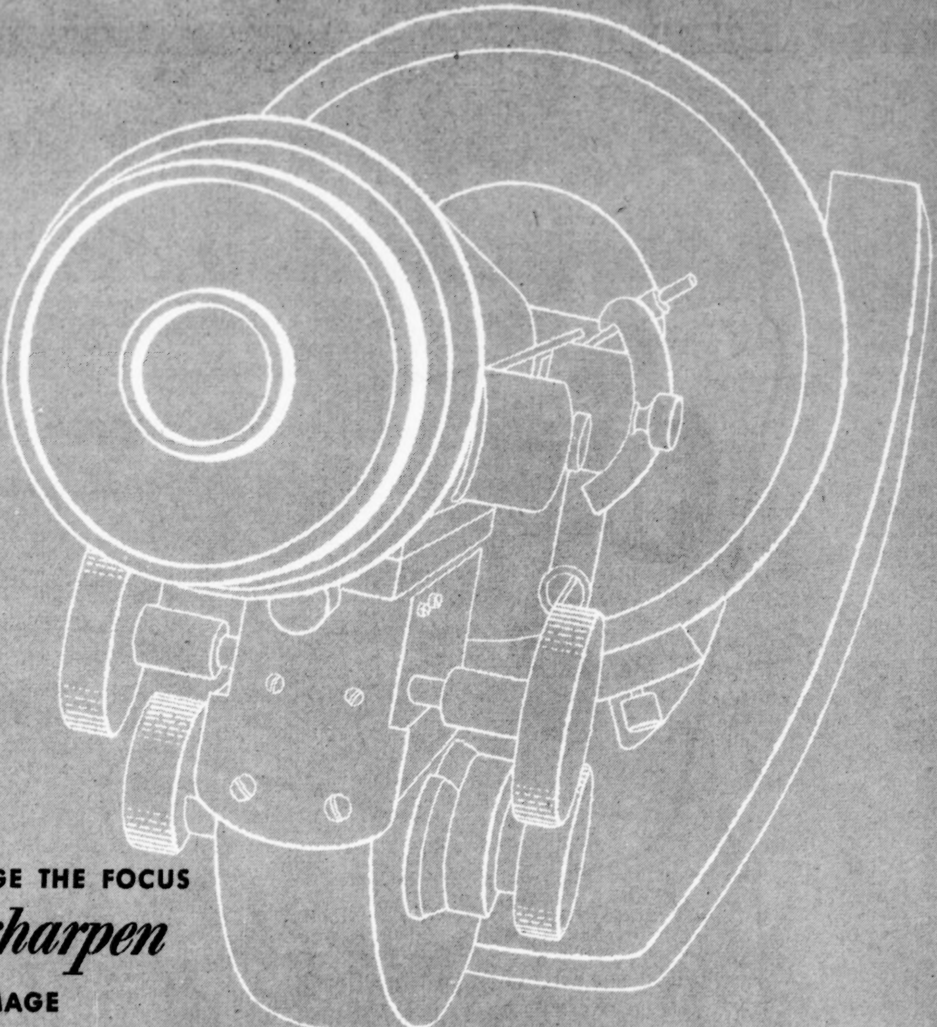

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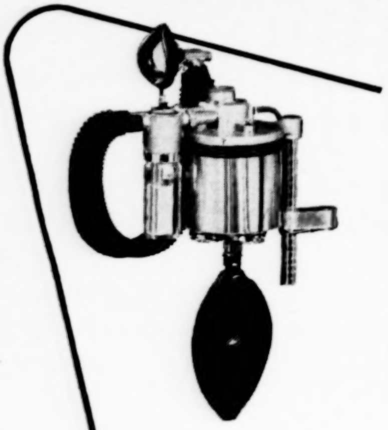

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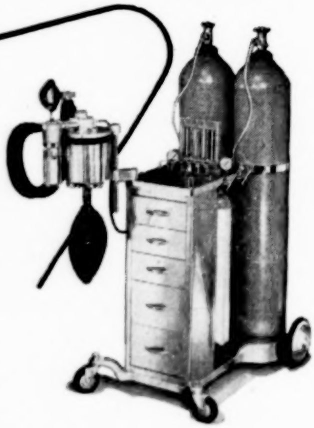

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The Journal of the American Association of Nurse Anesthetists

Vol. XX No. 1 February, 1952

Education on Borrowed Time

In all discussions of degrees of education for nurses—from practical nurses to postgraduate specialists such as nurse anesthetists—the irresistible force of attempts to raise standards inevitably meets the immovable object of professional tradition. New thought departments are being explored in this connection (see pages 2 and 37), but the channels of traditional thinking run deep.

The university-medical school-hospital tradition for the physician maintains a separate pristine existence, onto which are tenuously grafted the university-hospital-school of nursing or the hospital-school of nursing and the postgraduate courses for nurse specialists. The grafting simply amounts to the lending by the university-medical school or the hospital of certain members of the staff to the nursing school or the postgraduate course for teaching purposes. Any organic identification of medicine with nursing in educational institutions is scrupulously avoided.

Nursing early appreciated the cater-cousin relationship that would obtain if nursing education were controlled by the medical profession, but despite its vigorous independence nursing is still a poor relation, accepting the generosity of the medical school or hospital for instructors in the basic and postgraduate science courses. Herein lies the problem.

Nursing is too poor to provide its own battery of instructors in the sciences, and even though the nursing schools had the funds to do so, such a move would be unrealistic in the light of the teaching talent that is available in the university. But as more and more functions of the physician are being turned over to the nurse in both routine and special situations, it seems equally unrealistic that her educational needs to cope with these situations should be met by hand-outs from the medical profession.

An organic identification of nursing education with medical education is not impossible, even though at the present time it seems improbable in the face of class distinctions that persist in the field of medical care.

Anesthesia for the Surgical Treatment of Valvular Pulmonary Stenosis and Mitral Stenosis

Olive L. Berger, R.N.*
Baltimore

Because of the increasing use of surgery in the treatment of valvular heart disease, it seems proper to review our experience with the conduct of anesthesia in the surgical treatment of pulmonary stenosis and mitral stenosis. Brief comment will also be made on cardiac resuscitation, which is not infrequently necessary during such operations.

Congenital Pulmonary Stenosis

The concept of direct surgical attack on the pulmonary valve is not new. In 1913 Dumont[1] reported an unsuccessful attempt by Doyen to divide a stenotic pulmonary valve by inserting a small tenotomy knife in the right ventricle. After a long hiatus this procedure was revived and is now being performed successfully. Its performance is not an isolated development but is the natural outgrowth of extracardiac operations for intracardiac defects. These compensatory shunting procedures are typified by the artificial ductus operation for tetralogy of Fallot reported by Blalock and Taussig[2] in 1945 and since carried out more than 1,000 times in the Johns Hopkins Hospital alone.

Success with this procedure led quite naturally to a revival of interest in the direct attack on the obstruction to pulmonary blood flow that is present in tetralogy of Fallot and in pure pulmonary stenosis. A number of the early cases of pure pulmonary stenosis were erroneously diagnosed as tetralogy of Fallot; the usual artificial ductus operation improved the cyanosis but later resulted in heart failure. For this reason a direct attack on the point of obstruction was mandatory.

The initial successful valvulotomy for pulmonary stenosis was performed by T. Holmes Sellors[3] in 1947. His report of this case appeared soon after the publication by Russell Brock[4] of

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Read before the Eighteenth Annual Meeting of the American Association of Nurse Anesthetists, St. Louis, September 20, 1951.

*Senior anesthetist, The Johns Hopkins Hospital.

[1] Dumont, J.: Chirurgie de malformations congenitales ou acquises du coeur. Presse méd. **21**:860, 1915.

[2] Blalock, A., and Taussig, H. B.: Surgical treatment of malformations of the heart. J.A.M.A. **128**:189-202, May 19, 1945.

[3] Sellors, T. H.: Surgery of pulmonary stenosis. Lancet **254**:988, 1948.

[4] Brock, R C.: Pulmonary valvulotomy for the relief of congenital pulmonary stenosis. Brit. M. J. **1**:1121, 1948.

3 successful operations for this condition. In 1950 Brock[5] reported the cases of 33 patients submitted to operation, with a mortality rate of over 50 per cent in the initial 11 patients and a mortality rate of 18 per cent in the remaining 22. Six of these patients were successfully operated on by Brock while acting as visiting professor at the Johns Hopkins Hospital.

In a previous communication on anesthesia for the surgical treatment of congenital cyanotic heart disease, the statement was made that patients who exhibited exercise intolerance disproportionate to their oxygen saturation frequently presented difficulties during anesthesia.[6] These patients later developed right heart failure and were belatedly recognized as having pure pulmonary stenosis rather than tetralogy of Fallot. Some of these patients died, but others were fortunately saved by pulmonary valvulotomy and closure of the artificial ductus arteriosus.

"Pure" pulmonary stenosis is a narrowing of the pulmonary valve without an associated interventricular septal defect. The leaflets of the pulmonary valve are fused together to form a cone with a small opening at its apex. In 70 per cent of these patients there is a patent foramen ovale so that the stenosis is not really isolated, or "pure." In such instances unoxygenated blood may spill over into the left auricle in response to the high pressure that is transmitted back to the right auricle from the right ventricle. In advanced stages this right to left shunt is so pronounced as to produce obvious cyanosis, which leads to confusion with tetralogy of Fallot.

Taussig[7] stated that the incidence of pure pulmonary stenosis is about one tenth that of tetralogy of Fallot. Life expectancy is rarely more than 26 years. Since there is no interventricular septal defect and consequently no unoxygenated blood in the aorta (when the foramen ovale is closed), there is no reason to carry out a shunting procedure as is done for tetralogy of Fallot. Such an operation will increase the blood supply to the lungs but will also provide an intolerable strain on the heart. Since the primary, and in many cases only, defect is obstruction of the pulmonary valve, the logical approach to the condition is a direct attack with division of the obstruction at this point. This not only provides physiologic improvement but also restores the heart to an approximately normal anatomic condition.

Premedication. — Many of these patients are cyanotic children who present the psychologic problems common to all children who are pampered because of a disabling disease. As is true of all patients with cardiac disease, they are carefully studied and evaluated by the cardiologist before operation. Digitalis is given if there is evidence of heart failure, and quinidine is administered when arrhythmia is present. Penicillin therapy is begun the night before the operation and continued for eight to fourteen days after operation. The premedication of preference is morphine with atropine. These drugs are administered approximately ninety minutes before the onset of anesthesia. Patients with congenital cardiac disease, including infants, appear to have a high tolerance for morphine. The present trend is toward slightly larger doses of morphine than were formerly administered. The dose is computed on the basis of body weight, 1 mg. for each 5 kg. plus an additional 0.5 to 1 mg., depending on the condition of the patient. Atropine is administered in a ratio of 1:20 of the morphine medication up to a maximum of 0.6 mg.

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[5] Brock, R. C., and Campbell, M.: Valvulotomy for pulmonary valvular stenosis. Brit. Heart J. **12**:377-402, Oct. 1950.

[6] Berger, O. L.: Anesthesia for the surgical treatment of cyanotic congenital heart disease. J. Am. A. Nurse Anesthetists **16**:79-90, May 1948.

[7] Blalock, A., and Kieffer, R. F.: Valvulotomy for the relief of congenital valvular pulmonic stenosis with intact ventricular septum. Ann. Surg. **132**:3, Sept. 1950.

Anesthesia. — Anesthesia is induced by the semiclosed method, with maintenance by the to-and-fro absorption, intratracheal technic. The induction agent of choice for children and infants is cyclopropane-oxygen-ether. After intubation, anesthesia is continued with a mixture of ether and oxygen. Older patients are anesthetized with 2.5 per cent thiopental sodium (pentothal sodium) and d-tubocurarine chloride until they are intubated. Anesthesia is maintained by a mixture of ether and oxygen, as it is for children. Curare is administered only once, to facilitate intubation.

As our experience increased, we modified the anesthesia. The first 9 patients received curare in small doses intermittently throughout the operation. This practice was discontinued, because it may possibly have been related to the episodes of hypotension observed frequently. The use of procaine (1 per cent) or procaine amide (Pronestyl) intravenously to prevent the occurrence of cardiac arrhythmia during operation has been abandoned in the last 20 cases. Unless present before operation these arrhythmias are usually transient and are readily controlled by the topical use of xylocaine (1 per cent) injected into the pericardial sac, plus the local injection of ½ per cent procaine into the myocardium at the site of incision. Formerly, desoxyephedrine (Drinalfa) was routinely administered in appropriate dosage at the moment of opening the pericardial sac in the hope of maintaining an adequate blood pressure. This practice was abandoned because we now consider it better to treat conditions as they arise rather than to treat, prematurely, a condition that may not develop. Adequate ventilation with oxygen is more important than the injection of a variety of drugs. Assisted respiration by means of manual manipulation of the rebreathing bag is carried out continuously during anesthesia. The lung is held in as much expansion as is compatible with the exposure necessary for the surgical procedure. If deflation of the lung is necessary for adequate exposure, the patient is frequently given a rest period to permit reinflation of the lung and essential ventilation.

Early in the operation when the pericardium is opened, the pulse may become barely perceptible and the blood pressure unobtainable. As emphasized by Brock[8] drugs or other therapy cannot improve cardiac contraction in such cases until the valve is divided. The operation should be continued with dispatch, because delay in dividing the valve with the hope of improving cardiac contraction with drugs or oxygen may result fatally. After the valve is divided, the lung is reinflated, and there is usually pronounced improvement in cardiac tone with a return to normal of the pulse and blood pressure. In an attempt to decrease the incidence of arrythmia it was previously customary to inject 5 cc. of 4 per cent procaine into the pericardial sac five minutes before the pericardium was opened. This appears to be beneficial, although arrhythmias may still occur. Following the work of Bill and Wagner[9] 5 cc. of 2 per cent butacaine sulfate was used. Use of this drug was discontinued after two small children developed generalized convulsions following its use. Xylocaine (1 per cent) was then used as the topical agent. The incidence of arrhythmias appeared to be less. However, in the last two cases of the series the use of all topical agents was omitted with no untoward reactions.

An ice cap is placed over the soda lime canister routinely to prevent heat retention. Although some doubt has been expressed as to the value of this practice, we believe that it has been of material benefit. Hyperpyrexia has not occurred in these patients.

Statistics. — Pulmonary valvulotomy was performed on 53 patients with 6 deaths ocurring during anesthesia or the operation. One death occurred two hours after operation, which included a forty minute period devoted to cardiac resuscitation, making a total of seven deaths in the series. The youngest patient was 6 months of age; the oldest, 27 years of age. The usual age has been between 5 and 10 years.

Four cases of cardiac arrest occurred during pulmonary valvulotomy. All of these patients were successfully resuscitated. One, however, died on the tenth day after operation. This was a 4 year old, white, mongolian idiot in whom cardiac standstill occurred during dilation of the valve. The estimated period of arrest was four minutes. The other patients show no changes from their preoperative mental condition.

MITRAL STENOSIS

Up to this point the discussion has been concerned with some of the very considerable number of patients with congenital cardiac disease. An even larger number are incapacitated by acquired heart disease with rheumatic fever as the chief causative agent. It has been estimated that ½ to 1 per cent of the population is affected by valvular disease resulting from rheumatic fever.[10]

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[8] Brock, R. C.: The surgery of pulmonary stenosis. Brit. M. J. 2:399, Aug. 1949.

[9] Bill, A. H., Jr., and Wagner, J. C.: A method for the prevention of ventricular fibrillation during operation of the heart. Presented at the 36th Annual Clinical Congress of American College of Surgeons, Boston, 1950.

[10] White, P. D.: Chronic valvular disease in Cecil, R. L.: *A Textbook of Medicine*, ed. 4 (Philadelphia: W. B. Saunders Co., 1937).

As early as 1902 Brunton[11] suggested the possibility of direct surgical attack on the stenotic mitral valve. Twenty-seven years later Cutler and Beck[12] operated on the mitral valve of a patient who survived the operation for four years and was thought to be improved. Several similar single cases were reported during this period, but with subsequent death. After a long period of inactivity Harken, Ellis, and Norman[13] reported the surgical treatment of 8 patients with 3 operative deaths. Glover, Bailey, and O'Neill[14] reported a total of 50 operations on the stenotic mitral valve (commissurotomy) performed between June 1948 and June 1950. In this series there were 8 deaths, a mortality of 16 per cent. Keown, Grove, and Ruth[15] in a report of anesthesia for commissurotomy mentioned a a total of 116 operations performed prior to January 1951 with 14 fatalities, and 16 operations performed between January 1951 and April 1951 with 6 fatalities. Brock [16] first reported his procedure for mitral stenosis in 1949 and has since performed 9 operations with 2 deaths. Our series now numbers 32 with 2 deaths.

Patients with acquired valvular disease constitute an older age group than patients with congenital valvular disease. The youngest of our patients with mitral stenosis was 23 and the oldest was 47 years of age. Many of these patients have undergone one or more episodes of right heart failure with associated pulmonary edema. Such a patient is a substandard risk as is the patient with an enlarged heart, advanced age, or auricular fibrillation. While none of these conditions is an absolute contraindication, the preferred candidate for operation should be a person with a small heart and regular rhythm, no evidence of mitral insufficiency or lesions of other valves, and no sign of active rheumatic carditis. The decision to treat these patients surgically is a matter for the most careful evaluation by an experienced medical and surgical team.

Premedication. — Adequate preoperative sedation and medication are of the utmost importance. In an apprehensive tense patient pulmonary edema may develop before anesthesia is administered. Pentobarbital, 0.1 to 0.2 mg., is administered the night before operation, and repeated, if necessary, the next morning. Morphine, 12 to 16 mg., with atropine, 0.6 mg., is administered one and a half hours before anesthesia. At the discretion of the cardiologist atropine has been omitted for the occasional patient with excessive tachycardia. If the patient is orthopneic, he is anesthetized in a sitting position.

---

[11] Brunton, L.: Preliminary note on the possibility of treating mitral stenosis by surgical methods. Lancet **1**:352, 1902.

[12] Cutler, E. C., and Beck, C. S.: Present status of surgical procedures in chronic valvular disease of the heart. Arch. Surg. **18**:403, Jan. 1929.

[13] Harken, D. E.; Ellis, L. B., and Norman, L. R.: The surgical treatment of mitral stenosis. J. Thoracic Surg. **19**:1-15, Jan. 1950.

[14] Glover, R. P.; Bailey, C. P., and O'Neill, J. E.: Surgery of stenotic valvular disease of the heart. J.A.M.A. **144**:1049-1057, Nov. 1950.

[15] Keown, K. K.; Grove, D. D., and Ruth, H. S.: Anesthesia for commissurotomy for mitral stenosis. J.A.M.A. **146**:446-450, June 1951.

[16] Baker, C.; Brock, R. C., and Campbell M.: Valvulotomy for mitral stenosis. Brit. M. J. **1**:1238, June 1950.

Position.—The anterolateral approach is preferred. The patient is placed in the supine position with the left chest elevated by a sand bag.

Anesthesia. — Inhalation anesthesia is to be avoided for induction, because pulmonary edema is frequently present. The edema interferes with diffusion of the gases, and the induction phase is protracted. This tends to increase the apprehension and augments the pulmonary edema. A vicious cycle occurs. Our first patient operated upon for mitral stenosis was unwisely anesthetized with cyclopropane and oxygen. He was a man, aged 26, who had been in right heart failure for some time and was not responding satisfactorily to treatment. The operative risk was great, but surgical treatment was believed to be his best chance for ultimate survival. After fifteen minutes of anesthesia sufficient relaxation was obtained to introduce the tracheal catheter. Immediately a large amount of frothy fluid was ejected through the catheter. Pentothal sodium was promptly administered intravenously, and therapeutic measures were taken to control the pulmonary edema. These included a phlebotomy of 300 cc. of blood. After one and a half hours the edema was brought under control. It was deemed wise to proceed with the operation. A mitral commissurotomy was performed, and the patient did well under anesthesia. He made an uneventful postoperative recovery, and there was pronounced improvement in his cardiac status.

Pentothal sodium, 2.5 per cent, plus 12 to 15 mg. *d*-tubocurarine chloride to facilitate intubation is now routinely employed for induction. Curare is used only during induction. Anesthesia is maintained with ether-oxygen by the to-and-fro absorption technic with the canister connected directly to the tracheal catheter. After induction and intubation the conduct of anesthesia follows the same general pattern as that for pulmonic valvulotomy. Anesthesia for an occasional patient has been maintained with pentothal sodium and oxygen throughout the operation. Our preference is for ether-oxygen. Only small amounts of ether are necessary to maintain the anesthesia in midplane 1 of the surgical stage. All patients are reacting or conscious at the completion of the operation. The choice of agents for maintenance of anesthesia probably should be governed by the usual practice of the individual anesthetist.

Early in the series an attempt was made to prevent hypotension by an intramuscular injection of methoxamine hydrochloride (Vasoxyl) at the time the chest was opened. The results were not satisfactory, and the practice was promptly abandoned. Because of the marked diminution in the filling of the left ventricle during commissurotomy, the radial pulse may become barely perceptible and the blood pressure not detectable. This need not be of great concern if the heart action is constantly visualized and noted to be effectual. The pulse and blood pressure promptly return towards the normal with removal of the finger or instrument from the mitral opening. Should hypotension develop before the chest is opened a small dose of a vasopressor drug may be administered.

Intravenous administration of procaine 1 per cent or procaine amide (Pronestyl) was used in the early cases of this series in the hope of decreasing arrhythmias. We did not believe administration of these substances was of material benefit as a routine practice and have discarded their use. We believe that the emphasis should be placed on proper ventilation with a high percentage of oxygen in the mixture rather than on the employment of many drugs.

Before the start of the operation a cut-down is made on an ankle vein and whole blood administered to the estimated amount of blood loss. Overloading of the vascular bed must be avoided during operation.

Statistics. — Mitral commissurotomy was performed on 32 patients with no fatalities during operation. Two patients died in the postoperative period. One woman, aged 39, was an extremely poor risk and died twenty hours postoperatively. There were severe enlargement of the heart, auricular fibrillation, mitral and aortic insufficiency, and a large pulsating liver. The blood pressure was not obtainable before or during operation. The conditions described would now be considered as contraindicating surgical treatment. The second patient, on whom exploratory thoracotomy was performed without any direct attack on the heart, died on the second postoperative day of pulmonary embolism. The right auricular appendage and most of the right auricle were occluded by thrombi.

CARDIAC RESUSCITATION

During surgical treatment of congenital and acquired heart disease there will necessarily be some instances of cardiac arrest. Numerous reports attest to the importance of immediate adequate treatment of cardiac arrest. Kay[17] prescibed a program that we follow with encouraging results.

The anesthetist may be the first to observe the onset of cardiac arrest. Artificial respiration with 100 per cent oxygen should be immediately instituted and measures taken to restore cardiac action. Weinberger, Gibbon, and Gibbon[18] showed that if untreated cardiac arrest is present for three and one half minutes or more irreparable brain damage will result.

Ineffective cardiac action may occur in one of two forms: (1) ventricular standstill or (2) ventricular fibrillation. In ventricular standstill the heart is absolutely quiet or beats only rarely. In ventricular fibrillation there are continuous inco-ordinate contractions of individual muscle fibers. In either standstill or fibrillation the heart is not able to expel the usual quantity of blood. The differentiation be-

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17. Kay, J. H., and Blalock, A.: The use of calcium chloride in the treatment of cardiac arrest in patients. Surg., Gynec. & Obst. **93**: 97-102, July 1951.

18. Weinberger, L. M.; Gibbon, M. H., and Gibbon, I. H., Jr.: Temporary arrest of circulation to central nervous system; physiologic effects. Arch. Neurol. & Psychiat. **43**:615-634, April 1940.

tween standstill and fibrillation is important because the treatment of the two conditions differs.

In ventricular standstill the heart is compressed firmly ("cardiac massage") forty to fifty times per minute. If there is no response to one or two minutes of intermittent cardiac compression, 0.1 to 0.2 cc. of epinephrine 1:1,000 in 5 cc. of isotonic saline solution is injected into the left ventricle, and manual compression is continued. If the beat does not become effective after several minutes, the administration of epinephrine is repeated, and the dosage may be increased to 0.3 cc. If several injections associated with cardiac massage fail to restore a normal beat, 2 to 4 cc. of calcium chloride in 10 per cent solution is injected into the left ventricular cavity and massage continued. The administration of epinephrine and calcium chloride may be repeated every few minutes as often as necessary to establish a good beat. It is essential that cardiac massage be continued until an effective beat is restored.

In the case of ventricular fibrillation the heart is massaged until it is no longer dilated or cyanotic. This usually requires one to two minutes. Two saline-soaked padded electrodes are then placed on the right ventrical beneath the right auricle and on the left ventricle at the apex of the heart, and a 130 volt shock of one second or less is passed through the heart. If several single shocks are unsuccessful, the heart is massaged for another minute or two, and a series of six to eight shocks of 0.3 seconds each, with a 0.3 second interval between shocks, is passed through the heart. If serial defibrillation is unsuccessful on the first attempt, the heart is compressed intermittently for another minute or two, and serial defibrillation is again applied. After successful defibrillation cardiac massage is continued, and the beat may be resumed. If cardiac action is not re-established, the treatment for ventricular standstill is repeated. Epinephrine and calcium chloride are injected as needed.

The most important factor in successful cardiac resuscitation is the establishment of a definite routine with which all personnel are thoroughly familiar. The smooth functioning of such a routine when the emergency arises makes the difference between failure and success in cardiac resuscitation.

SUMMARY

A survey is given of the current practice in anesthesia for the surgical treatment of valvular heart disease, both congenital and acquired, at the Johns Hopkins Hospital. Emphasis is placed on the importance of effective ventilation with oxygen rather than on the administration of a variety of drugs.

Emergency Treatment of Cardiac Arrest

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Cleveland

Cardiac arrest in the operating room is the enigma and the challenge of present day surgery and anesthesia. It can occur at any time, regardless of whether the surgeon is skilled and in the habit of making complicated procedures seem wonderfully simple to an inexperienced intern. We cannot turn our heads and walk away from such a challenge, any more than we can walk away from a bleeding vessel. To ignore the challenge of cardiac arrest is to be derelict of duty.

I first became interested in this subject during the 1930's when I was working in Dr. Claude Beck's laboratory on the then important problem of cardiac adhesions.[1] We discussed cardiac arrest many times from many angles, but his story of the first instance of cardiac arrest that he ever witnessed is a classic. He was beginning his internship and was third assistant at an operation. The patient's heart suddenly stopped. The first assistant dropped out, left the operating room, and called the fire department. The surgeon of national renown did nothing. In due time the firemen lumbered into the operating room with a pulmotor. The patient remained dead. Nevertheless, at the time Beck thought that it was wonderful that they had the presence of mind to call the fire department. Shortly thereafter he realized that the medical profession should take care of these emergencies and not turn them over to the fire department.

My interest grew after I saw cardiac arrest in two relatively young patients during simple operations. The heart beat was restored but not in time to prevent damage to the brain. As an informed surgeon I became rightly fearful of such a complication and decided that I should have the proper knowledge to attempt to meet such a catastrophe if it should occur. My hope was that I would not find myself trying to explain such an accident to a stunned and mystified family.

Within the past few years the medical profession has shown an ever increasing interest in this subject, and medical journals, weekly magazines, and newspapers are now playing up this interest. Does this mean that the catastrophe is occurring more frequently than in the past? This remains an unanswerable question, for in the past these unex-

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Read before the Eighteenth Annual Meeting of the American Association of Nurse Anesthetists, St. Louis, Sept. 20, 1951.

*Associate Director of Course in Cardiac Resuscitation. Course made possible by a grant from the Cleveland Heart Society.

[1] Hosler, R. M., and Williams, J. E.: A study of cardiopericardial adhesions. J. Thoracic Surg. 5:629, 1936.

pected incidents were not publicized or studied. Everyone concerned was anxious to forget the unfortunate event as quickly as possible. There are no reliable figures to which one may refer; nevertheless, it is my considered opinion that this tragedy is occurring more often than in the past.

Only recently a writer from an old and well known national weekly, whom the associate director of the American College of Surgeons assured me was entirely trustworthy, followed me from Detroit to Cleveland to obtain a personal story on this dramatic subject. I was not interested in a personal story. Instead I gave him what I thought would be an impossible assignment, namely, to obtain permission from the American Medical Association and from the local medical school to take the course in cardiac resuscitation sponsored by the Cleveland Heart Society. Much to my amazement he, a layman, was permitted to take the course. I refer to this to emphasize the universal interest that has suddenly developed in cardiac arrest. As a result of this interest many studies are now being feverishly carried out in the medical laboratories of this country. Many new avenues of approach are opening up.

There has been considerable enlightenment on this subject during the past fifteen years. In June 1949 Beck and Rand demonstrated a suction cup defibrillating machine at the American Medical Association convention. Several physicians approached them afterwards and asked if they could be shown these newer concepts if they came to Cleveland. As a result of these inquiries, the Cleveland Heart Society, Dr. Beck, Mr. Rand, and I made plans in January 1950 for an educational program, which would be the first of its kind ever to be initiated in the world. It also initiated a movement to make it compulsory for a surgeon to be entirely familiar with the subject before he could obtain his specialty certificate. The Cleveland Heart Society quickly realized the need for such an educational program and made a grant of $5,000 to help it get started. Up until the first course was given in November 1950 we were not sure where we would hold forth.

At the present time one hundred and five surgeons and anesthetists [two hundred and thirty as of January 20, 1952] have taken the course. The course has been enthusiastically received. The enrolment represents persons from the four corners of the United States, and inquiries have been received from Europe. The Cleveland Heart Society's office in the Public Square Building does the paper work and the handling of applications. The training program is now a two day practical course in cardiac resuscitation, which is concerned primarily with those patients who die in the operating room. I am impressed with the practical aspects of this course and am writing this article with these in mind.

STEPS IN CARDIAC RESUSCITATION

In my opinion the most important point brought out in this course is the *separation of the re-*

suscitation procedure into two distinct steps. This is a basic contribution to successful resuscitation because it separates the things to do and the things not to do during the critical moments when life hangs in the balance. It focuses attention on the oxygen system and not the heart beat.

The two components are: (1) re-establishment of the oxygen system and (2) restoration of the heart beat. These are distinct steps, and one should not be confused with the other. With an understanding of these the problem becomes simple, provided that one can place and keep first things first and can exert the necessary perseverance.

We would like to believe that any normal heart that has stopped can be made to beat again. This is not a boastful or ridiculous statement, for it refers to the occasional patient whose heart to all intents and purposes is normal but rather suddenly and dramatically ceases to beat while on the operating table. When this occurs, it can be likened to turning off the ignition key in an expensive automobile. The car, theoretically, is as good as ever, but unless its motor can function, it is as worthless as a pile of iron. In the operating room we turn on the key by administering oxygen, and we crank the motor by massaging the heart.

This serious type of catastrophe occurs several times each year in every large hospital. It is said that in every 700 bed active hospital it will occur about five times a year. Others say that it will occur about once in every 1,000 anesthesias, an estimate that may be a little high.

This disaster can complicate any type of operation; nevertheless, I am impressed by the fact that it occurs so frequently during simple procedures for which the patient has been judged to be a good risk, while the poor risk unbelievably ''sails through." Could this mean that in the second instance everybody is a little more "on his toes"?

In the past cases of successful and complete cardiac resuscitation have been too few and far between. There are two main reasons for this failure, namely, (1) lack of a plan of attack and (2) severe inherent cardiac disease. The principal factor in the first reason for failure is an inability of those involved to understand the problem. The second reason is self explanatory.

In some patients the cause for cardiac arrest is entirely clear. In others the occurrence of cardiac arrest may be only a link in a chain of circumstances, and the precipitating factors may not always be obvious. A breakdown of the oxygen system can result from inability to deliver oxygen into the lungs, not enough available hemoglobin to transport the oxygen in the system, or a nonfunctioning hydrodynamic pump, which cannot circulate the oxygen-laden hemoglobin to the brain and vital organs. The ultimate offender is probably a state of hypoxia leading to anoxia in the tissues. The same is true of shock. In the simplest terms shock results from lack of oxygen in the vital tissues.

The factors predisposing to cardiac arrest are:

1. Underlying cardiac disease; coronary disease (probably accounting for the higher incidence in men).
2. Pulmonary disease with decreased vital capacity; decreased vital capacity may also result from position.
3. Anemia with decreased oxygen-carrying capacity of the blood predisposes to arrhythmias and vagovagal reflex.
4. Anxiety may result in increased secretion of endogenous adrenalin.
5. Drugs: excess administration of digitalis, quinidine, papaverine, etc.; excessive numbers and quantity of preanesthetic drugs; insufficient atropine.
6. Shock.
7. Poor cardiac filling from position, sudden reduction of intra-abdominal pressure, or hemorrhage.
8. State of nutrition.

Other predisposing factors may be present during the operation:

1. Hypoxia enhances excitability of ventricles.
2. Reflex stimulation under light anesthesia; according to Becker,[2] 66 per cent of cases of standstill and 91 per cent of cases of fibrillation occurred during the induction stage.
3. Torsion of the heart.
4. Anesthetic agents: cardiac arrest can occur during the use of any, but it is known that cyclopropane, ethyl chloride, and chloroform sensitize the heart to epinephrine. It appears that pentothal sodium is also a respiratory depressant and a histotoxic agent.
5. Respiratory tract or tracheal obstruction.
6. Excessive accumulation of carbon dioxide in tissues, in spite of good oxygenation.
7. Shock; cardiac depression; low coronary pressure.
8. Disorders near the cisterna magna.

Recognition that there are two distinct steps in cardiac resuscitation is important and has frequently been overlooked. Restoration of the oxygen system is the emergency act. Once this system is restored, the crisis is over, as the heart beat can then be restored almost any time. In fact, another surgeon could be summoned from some distance to restore the heart beat. A definite step-by-step plan must be understood and put into effect. The surgeon must be so geared to this that he can perform the proper steps reflexly and conquer his inertia. Most failures are attributable to limitations of time. The time limitation of three to five minutes must be overcome, otherwise the patient's brain is irreversibly damaged, although the heart is returned to normal.

Once cardiac arrest occurs, it is important to know what *should not* be done. There is no time to improvise or to indulge in gluteal cerebration. Time must not be taken in order to be sure that the patient is 200 per cent dead.

1. Do not listen for faint heart sounds. If there is no palpable pulse and no measurable blood pressure and if respiration has ceased, the surgeon can be certain that any slight movement of the heart is of no consequence.
2. Do not wait for an electrocardiogram.
3. Do not inject epinephrine through the chest wall into the heart.
4. Do not dilate the rectal sphincter.
5. Do not give a blood transfusion.
6. Do not undertake to administer artificial respiration by compression of the thoracic cage.

The time taken to carry out these maneuvers will insure against success in almost all cases.

In the re-establishment of the oxygen system, oxygen must be delivered into the blood, and the oxygenated blood must be circulated effectively. The anesthetist must be on his toes and alert. The first thing to do is to get a properly fitting tube placed into the trachea and then to inflate and deflate the lungs adequately by compression of a rubber bag filled with oxygen. If a tube is in place before cardiac failure occurs, so much the better. However, this procedure should not take over thirty seconds, and any hesitation in carrying it out is the first step towards disaster. This responsibility belongs to the anesthetist, as the surgeon at this point has too many other vital obligations.

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[2] Becker, A. H.: Survey of case reports. To be published.

Once the anesthetist can adequately aerate the lungs, the surgeon proceeds boldly to open the chest in order to squeeze the heart, which in turn will circulate the oxygenated blood. Matters such as shaving, cleansing the skin, draping, and putting on sterile gloves are subordinate and hardly need comment. Time should not be spent on asepsis. The surgeon does not count the interspaces but estimates the position of the fourth or fifth left interspace and makes a quick and deliberate incision from the sternum laterally for about ten inches. There is no bleeding, because there is no blood pressure. Later the internal mammary artery may have to be secured; this can be hoped for. The heart is then squeezed upward against the sternum. The crisis is now over, the oxygen system is functioning, the brain can now be kept alive, and the surgeon can begin to relax. His wrist may be strangulated between the ribs, and so he pauses long enough to cut the costal cartilages of the two ribs, thus permitting him more room. Immediately, additional manual massage is undertaken. A short time later a self-retaining retractor is introduced, and the pericardium can be opened from end to end. The left phrenic nerve lies well posteriorly. Now it is desirable to have an assistant take over in sterile gown and gloves. The surgeon can then cleanse the field and put on gown and gloves.

The surgeon must decide the best method for massage of the heart. The hand can be placed beneath the heart and the heart massaged against the sternum, or the fingers may be placed around the heart and the heart massaged in a milking fashion. Careful attention must be given to *emptying* both ventricles. Actual experience in this maneuver is the best teacher. During the course in cardiac resuscitation each participant massages the heart, and an electromanometer simultaneously records the blood pressure sustained. It is interesting to note the improvement of blood pressure with improvement of the massage technic. A blood pressure adequate to maintain life can be sustained in this fashion for as long as eight hours, as it was in a patient who is now a practicing lawyer in New York City.[3]

Up to this juncture it is not known whether the heart is in standstill or ventricular fibrillation. Since the procedure for resuscitation is entirely different in the two conditions, the surgeon now stops massage momentarily and observes the ventricles. If there are no fibrillary movements, he can assume that the ventricles are in a state of asystole.

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[3] Foote, M. N.: Personal communication to the author.

METHOD OF RESTORING BEAT IN CARDIAC ASYSTOLE

The heart in asystole may start beating after hand massage alone. If it should not start, 4 to 5 cc. of diluted 1:10,000 epinephrine solution is injected into the chamber of the right ventricle, and massage is continued. It is best to use a long no. 22 needle, insert it diagonally through the myocardium, and withdraw on the plunger so as to be sure it is within the lumen or chamber. Inserting the needle diagonally results in a self seal. The massage perfuses the epinephrine through the heart and then to the aorta and coronary arteries. The heart will then begin to beat if all conditions are favorable. If it fails to do so, the surgeon should check the excursion of the lungs and observe the color of the heart. If after three to five minutes of effective massage there is still no heart beat, epinephrine can be injected for a second and third time. If success has not occurred, an electrocardiogram should be made to make certain that the heart is not in ventricular fibrillation. If the heart is not in fibrillation and fails to beat, the reason may be faulty aeration of the lungs, faulty massage of the heart, or intrinsic cardiac disease. The importance of movement of the lungs is emphasized. When cardiac resuscitation is difficult and the procedure prolonged, a mechanical respirator is of great assistance and may mean the difference between success and failure. We prefer the Rand-Wolfe respirator.[4] Inadequate oxygenation of the blood and inadequate elimination of carbon dioxide are the common causes of failure to restore the heart beat. During one course, when it came time for the members to bring the dog's heart out of fibrillation, two dogs were used without success. Next the instructors tried in vain and at the same time commented that this was most unusual. The heart would seem to come out of fibrillation for three or four beats, and then ventricular fibrillation would recur. Finally, after the soda lime was changed, the heart, which had previously failed to come out of fibrillation, was restored to a normal rhythm within one minute. An increased concentration of carbon dioxide in the blood stream can precipitate cardiac arrest, and it can also prevent the heart from being restored to a normal beat.

METHOD OF RESTORING BEAT IN VENTRICULAR FIBRILLATION

In ventricular fibrillation the heart muscle is in a state of convulsion. There is such inco-ordination of the muscle fibers that the blood pressure is not maintained. In general, the method of defibrillation requires that steps be taken to abolish fibrillation before the co-ordinated beat can be restored. Three to 4 cc. of 1 per cent procaine is injected into the cavity of the right ventricle and immediately distributed by massage.* An electric shock is usually required at this juncture. It is applied by placing an electrode on each side of the heart so that as much muscle mass as possible lies between them. A shock is then applied for a moment. During the moment that the current flows through the heart, the muscle fibers are in a state of contraction. When the current is broken, the ventricles are either in asystole or have resumed fibrillation. In the former instance epinephrine and massage are used in the manner that has been described. If fibrillation recurs, massage is continued, and the administration of procaine and the shock procedure are repeated. If fibrillation still persists after two shocks have been applied, massage of the heart is continued and a small dose of epinephrine is used. To administer epinephrine in the presence of fibrillation is contrary to physiologic principles; nevertheless, Dr. Beck's experience, as well as my own, indicates that it can be effective. It can supply the stimulus that initiates the beat after the next shock. If the heart beat is not restored after many attempts, the surgeon must consider the following possibilities: (1) anoxia of the heart muscle; (2) retention of carbon dioxide; (3) the procaine effect; (4) the epinephrine effect; (5) intrinsic cardiac disease.

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[4] Wolfe, K., and Rand, J. H. III: Electromechanical aids in resuscitation and anesthesia. Ohio State M. J. **46**:39-40, Jan. 1950.

Experience has taught us that there are two tried and dependable drugs to have available, namely, procaine and epinephrine. We do not believe that they should be used in the same syringe in conjunction with each other, but that each one should be at hand in separate syringes. It is also necessary that a proper balance be struck between the amounts and sequence in which the two drugs are injected. Procaine reduces tone and tends to abolish all muscular activity; it aids in abolishing fibrillary movements as well as co-ordinated contraction of the ventricles. Epinephrine has the opposite effect: it restores tone and increases muscular activity.

In difficult cases circulation of the blood and ease of application of the electrical shock can be improved by the use of the Beck-Rand suction cup electrodes.[5] Particularly where the heart has lost its muscular tone,* the suction helps fill the ventricles of the hydrodynamic pump, and the heart can be squeezed at a rate up to 120 beats per minute. Although the effective blood pressure is not greater than that produced by manual massage, the volume of blood circulated is greater, and if the volume is greater, the amount of oxygen circulated is also greater.

CLOSURE OF THE CHEST

In the successful case the surgeon should not be in a hurry to close the chest. There is a great desire to get the chest closed and to walk away from the ordeal. The heart beat should be observed for a time, and if the surgeon is satisfied, the pericardium may be closed loosely with sutures. This will allow fluid to drain into the pleural cavity and prevent the heart from herniating through the pericardial opening. The chest is tightly closed, and the entrapped air removed with a catheter. Respiration and circulation are carefully observed. The patient should be kept on the surgical floor for some time. Intravenous administration of fluids or a transfusion may be judiciously started. The intratracheal tube is kept in place, as respiration may require support. Mechanical respiration is continued until the patient is able to breathe "on his own." A Drinker respirator may be helpful. A number of drugs have been used to aid respiration, to maintain blood pressure, and to slow the heart rate. These are caffeine, ephedrine, quinidine by careful intravenous injection, atropine, digitalis, wyamin, and calcium gluconate.

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* At times this drug is not necessary.

* Used for lack of a more descriptive term.

[5] Beck, C. S., and Rand, J. H. III: Cardiac arrest during anesthesia and surgery. J.A.M.A. 141: 1230-1233, Dec. 24, 1949.

RESULTS

Several types of results may be obtained:

1. Full recovery of cerebral function, of respiration, and heart beat.
2. Full recovery of respiration and heart beat with delayed recovery of cerebral function.
3. Full recovery of respiration and heart beat but permanent impairment of cerebral function.
4. Recovery of heart beat without recovery of respiration; the heart continues to beat only as long as mechanical respiration is administered.
5. Temporary recovery of heart beat but gradual decrease of blood pressure and death.

The subdiaphragmatic approach in massage of the heart is seldom successful. It can be safely used only when the upper abdomen is already open. A momentary thrust is permissible, but it must be stressed that no time should be wasted if the heart does not immediately start. Satisfactory manual massage is infrequently obtainable, and there is no opportunity to visualize ventricular fibrillation.*

The members of classes are permitted to carry out the preceding steps by themselves in the animal laboratory. In this course it is called to the attention of the class that certain instruments are necessary and must be available in the operating suite at all times, if success is desired. A sterile emergency package must be available to the surgeon. It need only contain a scalpel; self-retaining retractor; a few hemostats; scissors; a few sponges; two medicine glasses; two syringes—one for procaine and one for epinephrine—one with a glass and one with a metal tip; two long no. 22 needles; two sterile towels; gloves; and electrodes. Of equal importance, the anesthetist should have at hand a properly fitting intratracheal tube, a laryngoscope, a rubber bag, suction catheter, and oxygen.

Some new aspects in the field of cardiac resuscitation have been opened up for our investigation. Rand and I have been particularly interested in studying practical methods of protecting the brain during long periods of cardiac arrest. Much of our present investigation deals with subjecting the animal to cold to lower its metabolism and consequently reduce its need for oxygen. This work was stimulated by reports of complete resuscitation after the victim was drowned for an unusually long time. It was found that these people had fallen through ice. The work of William Bigelow of Toronto and the Dachau experiments also influenced our investigations.

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* Ventricular fibrillation is found almost as often as cardiac standstill.

We have been able to reduce a dog's temperature 20 degrees (centigrade) in less than one hour, stop the heart by an electric shock, and allow it to remain in this state for eleven to thirteen minutes before massage is started. The results indicate that the brain can be protected for periods long enough to open the heart for valvular and intracardiac surgery without the aid of expensive and complicated "heart-lung machines." The circulation can be interrupted for periods of seven to ten minutes, restored, and interrupted again later. We are also impressed with the fact that the adrenal glands need protection almost as much as the brain. We are familiarizing ourselves with the many roles and problems of carbon dioxide in the body. We have reason to believe that we are developing a practical means of reducing the oxygen needs of the patient suffering from acute coronary occlusion and by these methods hope to prevent the development of ventricular fibrillation during the early phases of the occlusion.

SUMMARY

A procedure for cardiac resuscitation in the operating room is described and under certain conditions may be successful. The requirements for success are discussed. The importance of separating the procedure into two components is stressed. Re-establishment of the oxygen system is the emergency act. Restoration of the heart beat can be established minutes or hours later.

The time limitation of five minutes must be met and overcome if complete recovery is to be obtained. However, this arbitrary time limit should not prevent one from carrying out this procedure. It is advisable that the surgeon persist in his efforts until all possibilities are exhausted.

It is not necessary to clutter up one's mind or operating table with the many types of drugs affecting the heart, as the value of procaine and epinephrine have been established. A mechanical respirator and suction cup electrodes are desirable pieces of special equipment. An emergency sterile package should be available.

A great future for cardiac surgery lies in the practical application of hypothermia.

Treatment of Burns

Observations on the Role of the Anesthetist

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and
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The severely burned patient presents a challenging problem to all those who care for him. Since several aspects of medical care are involved, the total care of the burned patient should be accomplished by a team. Ideally, this team includes the surgeon, the anesthetist, the nurse, the laboratory chemist, the physiotherapist, and the psychiatrist. Unfortunately, this ideal is seldom realized. Renewed emphasis on burns has been stimulated by recent information revealing the great incidence of thermal burns in atomic warfare. It is the purpose of this communication to outline the accepted principles of burn therapy and to present the phases of treatment that are of particular interest to the anesthetist.

PRINCIPLES OF BURN MANAGEMENT

Classification of burns. — Burns may be classified as first, second, and third degree, according to the depth of injury. A first degree burn is a simple redness commonly seen in sunburns and heals spontaneously in four to six days. A second degree, or partial thickness, burn is an incomplete destruction of the skin with viable remaining epithelial elements. It is characterized by blisters and oozing of plasma from the surface. If kept free from infection this type of injury will heal spontaneously in fourteen to twenty-one days. A third degree, or full thickness, burn is characterized by destruction of all the layers of the skin and sometimes the underlying subcutaneous tissue, muscle, and bone. The surface of this type of burn is dry, hard, dead white, or charred. Removal of the injured tissue and skin grafting are required for healing.

Emergency burn treatment. — Early evaluation of the extent of the burn is mandatory, because future treatment and prognosis depend on the depth and percentage of the body surface injury. The figure graphically depicts the "rule of nines," a simplified method for calculating the percentage of body surface involved.[1] Each

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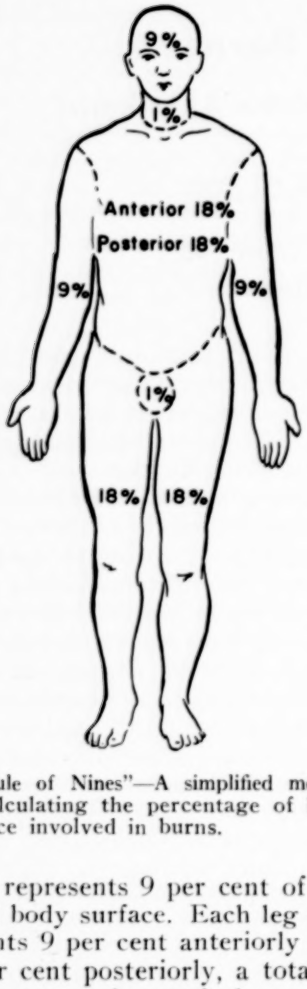
Read before the Annual Meeting of the Texas Association of Nurse Anesthetists, San Antonio, April 26, 1951.

From the Surgical Research Unit and the Department of Anesthesia, Brooke Army Hospital.

[1] Pulaski, E. J.; Artz, C. P.; Shaeffer, J. R.; Huckabee, W. E.; Mitchell, R. C., and Russell, J. P.: Exposure (open) treatment of burns. U.S. Armed Forces M. J. 2:769, May 1951.



"Rule of Nines"—A simplified method of calculating the percentage of body surface involved in burns.

arm represents 9 per cent of the total body surface. Each leg represents 9 per cent anteriorly and 9 per cent posteriorly, a total of 18 per cent for each lower extremity. The anterior aspect and the posterior aspect of the trunk each represents double 9 or 18 per cent of the body surface. The head represents 9 per cent, and the neck and the genitalia each represent 1 per cent.

Pain may be relieved by morphine, which should be given intravenously because subcutaneous medication is not readily absorbed by the burned patient. The prevention and treatment of shock always precede local care. Whole blood and electrolytes are given intravenously as early as possible. The requirements for these agents are usually formulated in accordance with the amount and depth of the body surface involved. To insure adequate fluid intake a large cannula is inserted into a suitable vein. A sufficient amount of fluid must be given to maintain a urinary output of 40 to 60 cc. per hour. An indwelling catheter is placed in the bladder of all patients with involvement of more than 25 per cent of the body surface to insure accurate measurement of the output. Antibiotics are given to prevent infection. An inital dose of 800,000 units of crystalline penicillin followed by 300,000 units of the procaine type daily is given. Tetanus toxoid or antitoxin is recommended.

Local care of burned surface.—As soon as the patient's condition is stabilized, the burn surfaces are thoroughly cleansed and débrided. All foreign material and devitalized tissue are removed. This usually requires no anesthesia, as the analgesia produced by the intravenous administration of morphine is sufficient. However, if the injury is several hours or days old, it may be necessary to use more potent agents for the débridement. We prefer to cleanse with a detergent containing hexachlorophene.[2] However, a bland soap will suffice. Two methods of local cover of the burned surface are available. Fine mesh gauze with overlying absorptive dressings is the universally accepted treatment. Recently the open, or exposure, method of local care has received widespread attention.[1] If the burn is allowed to remain exposed after cleansing, a firm plasma crust forms in forty-eight hours and serves as a protective dressing or cover. In partial thickness burns this crust desquamates in fourteen to twenty-one days and leaves a clean, nonscarred, well epithelized surface. In full thickness burns it is necessary to excise this eschar as soon as the patient's condition permits. The exact place of exposure therapy has not been definitely established. In our experience it is indicated for burns of the face and hands and for partial thickness burns on one side of the body. In the event of a major catastrophe the problem of supplies may make treatment by exposure imperative.

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[2] Artz, C. P.; Pulaski, E. J., and Shaeffer, J. R.: Clinical uses of hexachlorophene. U.S. Armed Forces M. J. 2:819, May 1951.

ROLE OF THE ANESTHETIST

Initial débridement and dressing.— Débridement and cleansing of the burned surface is usually performed in the operating room with the patient under the supervision of the anesthetist. Morphine analgesia (10 to 15 mg. intravenously) suffices for this procedure if the patient is seen within three hours after injury. Later, after the development of inflammation and sensory nerve irritation, it is necessary to add minimal amounts of pentothal sodium and 50 per cent nitrous oxide with 50 per cent oxygen for basal narcosis. An important function of the anesthetist is to maintain adequate ventilation and the constant infusion of blood and electrolyte solutions. Should there be a severe burn of the face with injury to the tracheobronchial tree, oxygen under positive pressure may be required for pulmonary edema. A tracheotomy is indicated if the airway is obstructed by edema of the trachea or pharynx.

Preanesthetic evaluation of the patient. — The anesthetist's duties are primarily concerned with anesthesia during the multiple dressings and skin-grafting procedures. In the preanesthetic evaluation of the patient it is important to make sure that anemia has been corrected. In all full thickness burns of 10 per cent or more of the body surface a significant anemia develops.[3] This is due to initial hemolysis in the burned area, toxic depression of the bone marrow, infection, and hemorrhage from the granulating surface. A normal blood volume should be maintained to insure wound healing and toleration of the surgical procedure. A hematocrit reading of 48 or above is good indication of an adequate blood volume in a normally hydrated patient. A patient with extensive full thickness burns requires a huge amount of whole blood. A 30 per cent body surface burn will require 12,000 to 15,000 cc. of blood during the sixty to ninety days of hospital care. The anesthetist should make certain that adequate blood is available for the operative procedure. As much as 1,500 cc. of blood may be required during a major grafting operation. Usually, 500 cc. or more of blood is lost during a change of dressing in an extensive burn.

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[1] Pulaski, E. J., et al.: loc. cit.

[3] Moore, F. D.; Peacock, W. C.; Blakely, E., and Cope, O.: Anemia of thermal burns. Ann. Surg. **124**:811, Nov. 1946.

The patient must be prepared psychologically for multiple operative procedures. It is recommended that these hyperirritable debilitated individuals be assured that anesthesia will be induced by pentothal sodium. This eliminates the universal fear of a mask on the face. Demerol (75 to 100 mg.) is preferred as the preanesthetic narcotic because of the absence of respiratory depressant effects and its atropine-like drying action. In addition scopolamine (0.4 to 0.5 mg.) is recommended for amnesic effect and suppression of secretions.

Face burns.—Scarring and contracture about the mouth are frequent complications of burns on the face. The use of a mask for anesthesia is contraindicated during grafting procedures about the head; intratracheal anesthesia is required. Great difficulty may be encountered during intubation because the mouth cannot be opened sufficiently to introduce the laryngoscope. Although blind nasal intubation may be performed for a single procedure, tracheotomy is recommended if repeated anesthesias are necessary. Adequate inhalation anesthesia may be administered through the tracheotomy tube without the fear of chronic anoxia.

Early administration of blood during the operation.—Blood loss in skin-grafting procedures on burn patients occurs early. Initially, blood loss is encountered upon removal of several drums of skin; immediately thereafter excision of granulations in the preparation of the recipient site causes rapid hemorrhage. In a two hour grafting procedure most of the blood loss occurs in the first thirty minutes. For this reason it is mandatory that administration of blood be started at the beginning of the operative procedure and that the administration be rapid. The cold hypotensive type of shock may occur at the end of one half hour of surgery if adequate blood has not been replaced early.

Insertion of the intravenous needle.—Rapid hemorrhage at the time the graft is taken and as the recipient site is prepared makes it difficult to keep ahead of the blood loss unless at least an 18 gage needle is firmly secured in a satisfactory vein. In large burns it is frequently difficult to find a suitable vein because of the areas involved in the injury and the repeated trauma to the veins by multiple transfusions. In such instances blood may be infused into the bone marrow through a Turkel needle.[4] The needle may be inserted into either the anterior aspect of the tibia or the sternum. In children under 4 years of age the sternal route is contraindicated and the tibial route advocated. Through this needle pentothal sodium may be given with almost as rapid an effect as if it were given intravenously. When both hands are burned and surgical treatment is required, it is wise to select a suitable vein in the ankle region. Not infrequently the needle in an arm vein is traumatically displaced during operative procedures on the hand. This may mean a loss of valuable time in maintaining adequate infusion of blood.

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[4] Turkel, H.: *Trephine Techniques of Bone Marrow Infusions and Tissue Biopsies*, ed. 4 (Detroit: Gale Printing Co., 1950).

Anesthesia during the application of the dressing.—Anesthetists are usually trained to decrease the amount of the anesthetic agent administered during the latter part of the operative procedure so that the patient is almost awake by the time he leaves the operating table. This is most desirable for many general surgical procedures; however, during skin grafting it may lead to a complete failure of the operation. Should the anesthesia be light and the patient move the extremity upon which the fresh grafts have been placed while the dressing is being applied, the grafted skin may be shifted beneath the dressing in such a fashion that there will be a poor "take." This is not an infrequent occurrence. One of the most important phases of the skin-grafting procedure is the careful application of a firm pressure dressing. Of necessity, this dressing is large, and its application is time consuming. Sometimes the anesthetist fails to realize the importance of this maneuver and allows the patient to move during this important step in the procedure. At no other time is absolute immobilization so important as it is at the termination of the operation when the all-important dressing is being applied.

Choice of anesthetic.—During a simple change of dressing or the initial débridement a small amount of pentothal sodium supplemented with nitrous oxide-oxygen is usually sufficient.[5] In the more extensive grafting procedures additional ether (1 per cent to 2 per cent) is advised. This small amount of ether affords potent analgesic action, stimulates respiration, and prevents postoperative depression by decreasing the amount of pentothal sodium required. When the patient is placed in the prone position for grafting of posterior areas, an intratracheal tube is essential. Because of the occurrence of respiratory difficulties in this position (even with adequate chest support) it is advised that minimal amounts of pentothal sodium (100 to 200 mg.) be given, that anesthesia be induced with nitrous oxide-oxygen-ether, and that anesthesia be maintained by ether-oxygen with assisted respiration.

SUMMARY

The anesthetist plays a most important role as a member of the professional team responsible for the care of the burned patient. Pentothal sodium and nitrous oxide-oxygen anesthesia is suggested for débridement and change of dressing. Additional light ether anesthesia is required for grafting procedures. It is pointed out that minimal quantities of anesthetic drugs with administration of a high percentage of oxygen are desired. A careful evaluation of the patient prior to each operation insures that anemia will be corrected and that sufficient matched blood will be available

(Continued on page 63)

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[5] Papper, E. M.: Anesthesia for the burned patient. Surgery 17:116, Jan. 1945.

Selection of Anesthetics for Surgical Patients

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The selection of an anesthetic for any given patient should be a co-operative project, taking into account the desires of the three individuals concerned—the patient, the surgeon, and the anesthetist. The patient may have very definite ideas as to the type of anesthesia that he desires, and it is well to consider his wishes in the matter as much as possible. If he has had an anesthetic before, he will probably have plenty to say about what he wants the next time. On the other hand, he may be expressing an opinion strictly on the basis of hearsay. At any rate, it is well to remember that his reaction to any type of anesthesia will be conditioned by what he knows or has heard about it. Obviously, some patients will make impossible requests, but if the surgeon takes a little time to explain why a certain anesthetic is indicated, it will help him to gain the patient's confidence. The patient is interested in comfort primarily; he wants no pain nor unpleasantness either before, during, or after anesthesia.

The surgeon is interested in accomplishing the surgical procedure proposed. He wants to do the job with a minimum of fuss and bother and without having to fight for relaxation and exposure. He will therefore appreciate any help given him by the anesthetist. If the anesthetic is poorly selected or administered, he can be made to look like a butterfingered imbecile, no matter how competent he may be.

The anesthetist is concerned with the safety of the patient under her care, and she must balance the factor of safety against the need for helping the surgeon gain the desired relaxation. In selecting the anesthetic she must consult with the surgeon and if necessary browbeat him a little to gain a reasonable compromise. Both should keep in mind that the anesthesia should be fitted to the patient rather than vice versa. I think it would be an excellent idea if all surgeons were required to have a definite amount of experience in giving anesthetics. There is no other way for the surgeon to gain insight into the problems of the anesthetist. Such experience would aid him in making an intelligent selection of anesthetics for his patients.

Today we have available a multitude of anesthetic agents, which can be used either singly or in combination. I would like

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to discuss some of the advantages and disadvantages of these agents. But first, let me mention the subject of premedication.

PREOPERATIVE PREPARATION

Preanesthetic medication is an integral part of the anesthetic procedure and may well determine the success or failure of any anesthesia. Proper timing is just as important as giving proper drugs in the correct dosage. This perfectly obvious fact is often ignored. If a patient comes to the operating room ten minutes after having had a hurried jab in the arm as a gesture towards premedication, he is not ready for the administration of an anesthetic. All too often the surgeon will start heckling the anesthetist to "get going" and then will put the blame for the resulting fiasco on her shoulders. How can he expect it to be otherwise if he is unwilling to let the medication become effective? The drugs commonly used prior to anesthesia take about an hour to become effective, and it would seem reasonable to plan for this time interval in all cases.

Another common offense is the giving of an anesthetic to a patient whose stomach is not empty. An unthinking surgeon or anesthetist may believe that an interval of four or five hours since the last meal is adequate for the emptying of the stomach. It is wise to remember that the stomach of a patient in pain retains food long past the usual time, so that one must take into account the interval between the last meal and the injury, *not* the time between the last meal and the beginning of anesthesia. In case of doubt, the use of a stomach tube will be helpful. It removes the liquid material by suction and usually causes enough vomiting to bring up any large food particles.

ANESTHESIA FOR INFANTS AND THE AGED

Some special problems arise regarding anesthesia for infants and elderly patients. As a rule, infants and small children are best anesthetized with drop ether. The high metabolic rate of children makes them require relatively large amounts of the anesthetic during the stage of induction. It should be kept in mind that a child's oxygen demand is high and that even minor degrees of hypoxia are poorly tolerated. The narrow respiratory passages are readily obstructed by small amounts of mucus. The tissues are easily traumatized, and even slight laryngeal edema may cause obstruction. For that reason intratracheal anesthesia must be used sparingly and carefully. By using open drop ether one avoids resistance to respiratory effort and also avoids increasing the dead space in the respiratory system. The effort involved in forcing large volumes of gas through the tubes and channels on a gas machine devised for adults may tax the child's reserve, especially if the anesthesia is prolonged.

Novocain infiltration of the abdominal wall is sometimes used for infants, but it is not advisable unless the infant has an upper respiratory tract infection and drop ether is contraindicated. Novocain infiltration prolongs the operative time and probably also interferes with wound healing. Relaxation is not good, and a straining child may force out his intestines, and a state of shock may develop as a result. Intravenous administration of pentothal sodium is unsuitable for children, regardless of the type of surgery contemplated. It can be used rectally as a basal anesthetic, but it is inferior to avertin for that purpose.

In aged patients it is easy to make the mistake of using too much premedication and too deep a plane of anesthesia. Old people tolerate barbiturates, morphine, and scopolamine poorly. Demerol in small doses combined with scopolamine is generally satisfactory for premedication. Local anesthetics and nitrous oxide with plenty of oxygen and curare are usually the best anesthetic agents for these patients.

Choice of Anesthesia

Ether remains the best anesthetic agent available for all types of patients, of all ages, and in all states of health. It is adaptable to nearly every type of operation, can be given with a minimum of equipment, and has a wide margin of safety. Perhaps its chief disadvantage is that it is unpleasant to the patient. However, I think that the nausea and vomiting following ether anesthesia is more distressing to the relatives than to the patient. He probably would recall little of it if he were not told how sick he was and how dreadful he looked. For most abdominal and pelvic operations nitrous oxide–oxygen induction followed by the administration of ether intratracheally is highly satisfactory. The addition of curare completes an excellent anesthetic combination. A good alternative is cyclopropane anesthesia. It has the one great disadvantage of being dangerous in the presence of cardiac abnormalities. There are really few contraindications to the use of a combination of gas, oxygen, and curare. The presence of an upper respiratory tract infection, a desire to use either the hot cautery or the electrocautery, and the presence of intestinal obstruction constitute the important ones.

Nitrous oxide is little used as a primary agent except for brief procedures on outpatients. It does, however, have one definite field of usefulness. Fractures of the hip in elderly patients can be nailed readily with the patient under nitrous oxide and oxygen anesthesia, supplemented, if necessary, with local infiltration anesthesia. Little relaxation is needed, and light anesthesia suffices.

Avertin is a much neglected but excellent basal anesthetic agent. For thyroidectomies avertin supplemented with nitrous oxide and oxygen is particularly satisfactory. It is also useful for children, as it facilitates the administration of ether and frees the child from the unpleasant memories of an ether induction.

Although local anesthesia seems to have been crowded out of the picture recently, except for minor surgical procedures, it de-serves consideration in many fields. For the elderly patient with severe cardiac disease it is useful in all types of emergency operations, i.e., draining an empyema of the gallbladder or repairing a strangulated hernia. A patient with obstruction of the large bowel can undergo emergency cecostomy under local anesthesia with little ill effect, whereas inhalation anesthesia might be sufficient to tip the scales against him. Local infiltration anesthesia for the reduction of fractures in elderly patients or in young adults with full stomachs is highly satisfactory.

The use of pentothal sodium is widespread. It has become popular because induction is rapid and because of the low incidence of unpleasant after-effects. The patient likes it because, from his viewpoint, it has all the things he wants from an anesthetic. It is, however, used improperly in many instances. Pentothal sodium is a dangerous agent, not so much because of its inherent properties, but because many anesthetists using it lack proper respect for its dangers. It is employed blithely by anesthetists who make no provision for inserting an intratracheal tube in case of serious laryngospasm. It is used for prolonged anesthesia, and the anesthetist wonders why the patient seems a little cyanotic for several hours after returning to his room and why he seems a little foggy for two or three days more. This agent is fine for short anesthesias and for those in which relaxation is not needed or can be obtained briefly by the addition of curare. Since both pentothal sodium and curare are respiratory depressants, this combination is unsafe unless the anesthetist is prepared to institute controlled respiration with oxygen at once. A mixture of curare and pentothal sodium is safest when the drugs are given separately and fractionally. Pentothal sodium is perhaps most valuable in orthopedic and plastic surgery, where the use of the electrocautery is desirable and relaxation is unimportant. It is a good agent for anesthesia for cystoscopy and for gynecologic operations by the perineal approach, where, again, relaxation is not needed.

Spinal anesthesia, the agent administered either in a single dose or fractionally, is in many respects superior to all other types of anesthesia. The profound relaxation of abdominal muscles and increased tone of intestinal musculature are valuable to the abdominal surgeon. Diaphragmatic overactivity is usually absent, and there seems to be less ileus postoperatively. Intestinal obstruction is a strong indication for its use in most cases.

In the presence of a distended bowel complete relaxation is imperative. In many cases of intestinal obstruction one finds relaxation of the pyloric musculature, which favors regurgitation of stomach and intestinal contents. With the patient under general anesthesia one is apt to get aspiration of this material into the bronchial tree. This may happen even when an intratracheal tube is used with inhalation anesthesia. With spinal anesthesia there is little danger of aspiration if the patient vomits.

Spinal anesthesia is ideal for young and healthy adults. Saddle block spinal anesthesia is ideal for hemorrhoidectomy or excision of a pilonidal sinus. For high abdominal operations, such as gastric resection, it must be used with caution. It is also more dangerous than inhalation anesthesia for a patient with recent severe hemorrhage even though he has received liberal transfusions.

Although Kennedy[1] detailed histories of 12 cases of paralysis following spinal anesthesia, there seems to be no need to abandon the use of spinal anesthesia because of the dangers emphasized in this article. Rather it should serve to caution the many surgeons who use it routinely without adequate consideration of the patient, the character of the operation to be performed, or the possibility of complications. It is quite true that spinal anesthesia has many dangers far too little appreciated by some surgeons and anesthetists. It has a definite field of usefulness and should be confined to properly selected cases.

CONCLUSIONS

I would like to point out the fact that a good anesthesia is also a simple anesthesia. Current practices in some departments of anesthesia are to be deplored. I refer to the use of multiple anesthetic agents in complex combinations. At a time when surgeons are simplifying their technics, anesthetists are making theirs more elaborate and without adequate reason.

Why is such a practice undesirable? The needless use of many drugs simultaneously is to be frowned upon because evaluation of each drug's good and bad features becomes impossible in circumstances involving so many variables. It amazes me that an anesthetist can use a mixture of pentothal sodium, procaine, and curare intravenously along with one or more gaseous agents and sit there complacently as if he really knew what he was doing. It is difficult enough to detect the warning signs of toxicity of one or two agents. When multiple agents are used, a difficult job becomes impossible. If an anesthetic accident occurs under such circumstances, it is improbable that the cause can be determined. The modern anesthetist's concoction contains agents with deadly potentialities, and he will do well to remember that fact.

SUMMARY

Some general problems related to the selection of an anesthetic are discussed. For children drop ether is to be preferred. Local anesthesia is generally most suitable for elderly patients. The advantages and disadvantages of some common anesthetic agents are mentioned briefly. The advantages of using a simple anesthetic agent are stressed.

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[1] Kennedy, Foster; Effron, A. S., and Perry, Gerald: The grave spinal cord paralyses caused by spinal anesthesia. Surg., Gynec. & Obst. **91**:385, Oct. 1950.

Anesthesia As a Nursing Function

A Forum

The forum opened at 2:45 p.m., Monday, September 17, 1951, at Arena Hall, Kiel Auditorium, St. Louis, with Myra Van Arsdale, R.N., chairman of the A.A.N.A. Public Relations Committee, presiding.

MRS. VAN ARSDALE: This forum was planned to try to clarify some of the prevailing concepts about the practice of anesthesia. We would like to find out if the nurse anesthetist is performing a nursing function, a medical function, or a separate function. If we can get the answers to these questions, then where does the responsibility for her education and training reside—in the school of nursing, in the hospital, or in the school of medicine?

There are a variety of opinions current about the practice of anesthesia, and I am sure most of us have heard them from time to time from either physicians or nurses. Some of these opinions are: that the practice of anesthesia is the practice of medicine; that the practice of anesthesia by nurses is the practice of medicine without a license; that the practice of anesthesia by nurses is in a no man's land and is neither a nursing nor a medical function; and that when a nurse practices anesthesia she is no longer practicing nursing and is therefore not subject to the legal and professional obligations governing the practice of nursing.

In this forum we shall try to find the answers to such questions as: (1) What is the practice of medicine? (2) What is the practice of nursing? And (3) what is the practice of anesthesia?

We have with us to discuss this subject a group of persons whom we believe to be outstanding in the field of medical care. I would like to introduce to you Mr. Emanuel L. Hayt, attorney-at-law from New York City, who is an authority on the laws governing hospitals and medical practice.

Dr. August H. Groeschel, assistant director of the New York Hospital, who has made a special study of the administrative aspects of the employment of nurse anesthetists.

Miss Louise Knapp, director of nursing at Washington University, St. Louis, who is well qualified to discuss the scope of nursing function as it impinges on the practice of medicine.

Dr. John S. Lundy, head of the Section on Anesthesiology at the Mayo Clinic, whose experience as the director of an anesthesiology service that employs both nurse and physician anesthetists qualifies him to delineate the practice of anesthesia in relation to nursing and medicine.

Dr. Franklin Walton, assistant surgeon, Washington University, St. Louis, whose broad experience and eminent standing as a surgeon qualify him to appraise nursing functions as they apply to the care of the surgical patient.

Dr. Frank R. Bradley, director of Barnes Hospital, St. Louis, whose broad experience as a hospital administrator and officer of the American Hospital Association equips him to act as a philosophizing moderator in rounding out and summing up the several phases of the discussion.

The first part of the discussion deals with the legal aspects of medical practice and medical and nursing functions, and from the first group of questions directed to Mr. Hayt we will try to arrive at a succinct definition of what is the practice of medicine and nursing.

Does the law, Mr. Hayt, say that certain acts are the practice of medicine, and, if so, what are these acts?

Mr. Hayt: As my plane landed on the airfield here yesterday, a passenger who was sitting alongside of me remarked, "So I didn't need my insurance, after all."

I think these questions are the type that can stump any lawyer, myself included, and they furnish excellent material for the cross examination of any member of the bar who dares to question the right of a nurse anesthetist to administer anesthesia.

As counsel for your association, I want to tell you that irrespective of whether or not you are administering anesthesia legally, you are doing a good job of it, and I have not heard of any nurse anesthetist's having gone to jail yet for administering anesthesia to a patient.

The law does set up certain standards by which to define any act as the practice of medicine. What is used is a statutory definition, which is found in the statutes of all states, of the practice of medicine.

The practice of medicine consists of three elements: The first is the judging of the nature, character, and symptoms of the disease. We know that nurses do not violate this particular rule, that a nurse does not attempt to make a diagnosis, which is what this amounts to when it says that the first element is in judging the nature, character, and symptoms of the disease. Therefore, that rules her out from the illegal practice of medicine. The second element says that the practice of medicine also consists in determining the proper remedy for the disease. Well, no nurse anesthetist determines the type of operation to be performed. Third: In giving or prescribing a remedy for the disease. Certainly, you prescribe no remedy for the disease. However, if you select the type of anesthetic to be used in an operation, you might be regarded as having indulged in the practice of medicine, because in that case you are prescribing, or aiding in the prescribing of, the remedy. If the person who makes the diagnosis also prescribes the medicine for the patient, he is practicing medicine. In other words, if you are prescribing the anesthetic to be used, you are practicing medicine.

But the law goes on to say that the mere giving of medicine, prescribed by the physician in charge of the case, who has made the diagnosis and who directs the manner, the time, and the character of the medicine to be administered, has never been considered the practice of medicine.

The question has been asked whether the administration of anesthesia is the practice of medicine. The answer is that when it is done by a physician it is the practice of medicine, and when it is done by a nurse, who performs under the supervision of a licensed physician, the administration of anesthesia is the practice of nursing.

A nurse anesthetist cannot practice medicine. Otherwise, she is doing something that is illegal, but the administration of anesthesia, when performed by a nurse under the direction and supervision of a licensed physician, is a legitimate part of the practice of nursing. Were that not so, you women wouldn't be sitting here. You would all be enjoying the fare of various penal institutions throughout the country.

MRS. VAN ARSDALE: Thank you, Mr. Hayt.

Along these lines, how would you define diagnosis, and does the law say that any specific acts are diagnosis?

MR. HAYT: If after you have listened to us for a half hour or so I should say to you, "You look sick," I would not be making a diagnosis. I might be stating a fact; I might not.

In order to make a diagnosis, it is necessary that a person hold himself out as having the proper educational qualifications and the proper ability and experience to do so. The diagnosis, or the opinion, that is rendered by this so-called practitioner must be made with the intent that you rely upon it for the purposes of treatment. Hence, if I were to say to you, in the event that you complained of having a stomach ache, that, in my opinion, what you have is appendicitis, I would not be making a diagnosis, even though I said that I think you ought to have an operation, because I have not held myself out as capable of making a good diagnosis, and you would have no intention of relying on my judgment. But if you went to someone who made an examination, and asked you certain questions, and pretended at least to know what the answer was to your problem, and if that individual stated to you that, in his opinion, you were suffering from a certain condition or disease, and if that person advised you as to what ought to be done, that would constitute a diagnosis.

MRS. VAN ARSDALE: Does the law delineate certain acts as the practice of nursing, and, if so, what are these acts?

Mr. Hayt: That is always a good question. We have a legal definition, as you know, of the practice of nursing. The definition is not the same today as it was some years ago. In fact, the tendency throughout the country is to split up the old definition so as to provide for the functions of the practical nurse today as well as for those of the registered nurse.

The definition of nursing that is being adopted throughout the country states that a person practices nursing who, for compensation or personal profit, performs any professional service requiring the application of the principles of nursing, based on biologic, physical, and social sciences, such as the responsible supervision of a patient requiring skill in observation of symptoms and reactions and the accurate recording of the facts, and the carrying out of treatments and medications as prescribed by a licensed physician, and the application of such nursing procedures as involve understanding of cause and effect, in order to safeguard the life and health of a patient and others. In addition, we have a definition today that defines the authority of a practical nurse. That definition states that the practical nurse is a person who is trained to care for selected subacutely ill, convalescent, and chronically ill patients and to assist the professional nurse in a team relationship, especially in the care of those more acutely ill. Now, that definition has been adopted by some states; others have varied the definition. But, in general, we have today two definitions of the practice of nursing, so as to distinguish the practical nurse from the professional nurse.

The difference between nursing and the practice of medicine is something that is causing a great deal of concern and is not always subject to exact definition.

I am going to read to you a section on the "Legality of Clinical Procedures by Nurses"—because, after all, the administration of anesthesia is a clinical procedure—from a new edition of our book, which will appear in November and of which Dr. Groeschel, who is beside me, is a co-author. We say there:

> "It is sometimes difficult to draw the precise line between nursing care and medical practice. Although the general definition of what constitutes the practice of medicine can always be referred to, yet it is not possible in every case to fit the exact procedure within one of the elements of the definition. The question in the particular case may have to be decided by the testimony of expert witnesses, such as physicians, as to whether the act is regarded by physicians in the community as within the peculiar and exclusive field of medical practice. In a criminal prosecution or any proceeding involving the question of whether the act was nursing or medical practice, the final interpretation may be for the jury or the Court, if the case is tried without a jury. Nurses in some hospitals are permitted to perform certain clinical procedures. Opinion among medical and hospital people is divided as to its propriety. Sometimes the decision depends on the training and experience of the nurse, whether the act is to be done under the direction or under the supervision of a physician, the emergent nature of the situation, the availability of sufficient medical personnel, the custom in the community among hospitals and physicians."

Mrs. Van Arsdale: Mr. Hayt, if the giving of an enema is a nursing function, is a physician practicing nursing if he performs this act?

Mr. Hayt: All physicians have the right to practice nursing, but I would like to see them do it, but nurses may not practice medicine. However, nurses are permitted, under certain conditions, to perform medical acts, providing they do so under the supervision and at the direction of a licensed physician, and provided they are qualified by reason of training and experience to do so.

Mrs. Van Arsdale: Well, could he be prosecuted under the law for practicing nursing if he is not a registered nurse?

Mr. Hayt: No, I don't think he could be prosecuted under the law for doing that, although he ought to be.

Mrs. Van Arsdale: Would you say that under the law the practice of nursing and the practice of medicine are mutually exclusive acts?

Mr. Hayt: They are mutually exclusive acts, except in certain areas. The administration of anesthesia is one of the areas where the act becomes nursing when, as I indicated, it is performed under the direction and supervision of a licensed physician. That is becoming increasingly true as medicine develops new technics and new discoveries are made in the clinical phases of medicine. The tendency today is to assign to the registered nurse more and more functions that were formerly performed by licensed physicians, and that must be so because the physician today has to have more assistance. The nurse today is better educated than she was, say, thirty or forty years ago or even twenty years ago, and she is becoming better qualified to perform those acts that were exclusively the function of the physician at one time.

Mrs. Van Arsdale: Does the law recognize the overlapping of responsibilities of physician and nurse?

Mr. Hayt: Yes, the fact that nurses may administer anesthesia is one evidence of the fact that the law recognizes that there is an overlapping and that it is perfectly proper.

Mrs. Van Arsdale: And it is possible that a medical function fifty years ago might be considered a nursing procedure today? Is that correct?

Mr. Hayt: Yes, that definitely is the trend. The law is static, I regret to say, and it does not keep abreast of science, but it does recognize that science may and should influence the law. So while we may have these ancient definitions, they are interpreted by the courts to bring about a more reasonable result.

Mrs. Van Arsdale: Thank you, Mr. Hayt.

Dr. Bradley, I wonder if you would summarize Mr. Hayt's remarks for the group.

Dr. Bradley: Well, Madam Chairman, I think it would be difficult to summarize entirely at this time. I may simply pick out some milestones.

The other members of the panel will develop this thesis, which has been outlined, the question of what is the nurse anesthetist's function—a nursing function, a medical function, or a separate function—and so I shall try to give an interval summary of what Mr. Hayt has said.

I should like to say, in my own words, that the practice of medicine has considerable legal immunity. That legal immunity permits physicians to operate largely under what is known as common law, or custom, as long as it is for the best interest of the patient and there are no malpractice suits. That fact and the need for nurse anesthetists led Dr. Crile at the Crile Clinic and the Mayos at the Mayo Clinic to develop schools for nurse anesthetists and to permit them to carry out procedures that, in the opinion of the physician, the nurse when trained was competent to do. That answers the question: Is it possible that what was a medical function fifty years ago might be considered a nursing or a technical function today? The answer is "Yes," and it resides in the opinion of the physician.

I think the definition that Mr. Hayt gave us—that the administration of anesthesia by a nurse under the direction and supervision of a physician is such that she is practicing nursing—probably is the best summary that I can give at this time.

I should like to point out that the law does recognize overlapping, because these functions are not subject to exact definition.

I think we should go on to the other members of the panel, so that in our final summary we can come a little closer to a very broad question.

Mrs. Van Arsdale: Thank you, Dr. Bradley.

We will now ask our authority on nursing to answer some questions on nursing service in relation to the practice of medicine and nursing.

Miss Knapp, I would like to ask you how you determine in administering a nursing service where the practice of nursing leaves off and the practice of medicine begins?

Miss Knapp: That is a rather difficult question. I think you are all aware at the present moment of the fact that we are a little short of nursing personnel. We find that the physicians are just as busy as the nursing group. Therefore, as soon as the physicians have developed a new method of diagnosis or a new method of treating patients, and they can outline what they want done, they look around for some handy person who is available twenty-four hours a day to carry it out. The eye generally lights on the nurse, and they want her to give intramuscular injections, or they want her to do certain things that need to be done.

I think this leads us then around the circle to a consideration of what is happening in the hospital. It used to be that most of the people you saw in the hospital fell into the classification of patients, nurses, or physicians, but that isn't a complete description of the modern hospital. We have found that the physicians needed specialized assistance in various areas, and in the past few years we have seen the development of the medical social worker, of the dietitian, of the nurse who is a specialist in many areas, the nurse anesthetist, the laboratory technician, the physiotherapist, and all of those wide varieties of professions that are needed to supplement and to act as members of a team. I think this is one very important thing for us to keep in mind: There is no individual in the hospital today who is able to meet completely the needs of the patient. We can, however, develop teams and team activities, which will make it possible to do all those things for a patient.

I don't know what that word suggests to you, but I always think of a team as being a group of people working towards a common goal, where the ball is tossed from one person to another, and the relative responsibilities are such that one person may pitch the goal one time and someone else may pitch it another time, so that you aren't just anchored to one place and that is all you can do.

Certainly, it has been our experience in nursing in recent years that the physicians have handed over more and more of the activities that used to be solely their responsibilities to the nursing group, and we have immediately turned around to see which of our responsibilities we can turn over to some other groups, at the present moment largely nonprofessional workers.

Can we delegate some of our earlier responsibilities to the housekeeping department, clerical assistants, to nursing aides or assistants, to the volunteer worker, to the floor secretary, to the laboratory workers? How do we reallocate the duties? As far as I know, we can anticipate that similar developments will continue to occur, so that what is the line of demarcation at this moment between what the physician does and what the nurse does will not be a fixed line, but it will shift, and we will have more things included in our responsibilities in the next few years than we have even at this particular moment.

Mrs. Van Arsdale: Miss Knapp, what examples could you give of the alpha and omega of nursing function?

Miss Knapp: Well, I suspect I hinted at it in the beginning, that, after all, the nurses often do all those things that all the other groups in the hospital do, when the other people in the hospital go off duty. If the hospital administrator isn't there, the night director takes over all the things that are hospital administration. If the cooks go off duty at 6 o'clock, she takes over all the cooking functions from 6:00 p.m. until 7:00 a.m. If the physician isn't there, she does what she can as an emergency measure until she can get him up or get him in to the hospital. So that it is rather confusing to outline the beginning and the end of the nurse's functions. I would say though at this time that we are honestly trying to consider more completely the needs of the individual patient and to see how, as a professional group, we can plan for the development of personnel who can meet those needs more completely than we have in past years. I would say that we need to do what we are doing probably better than we have been able to do it in the past. Let me give you a simple illustration of some of the things that I mean under that heading: Perhaps it is true in some hospitals today, but it used to be assumed, that when the patient came in the hospital, we wanted him to be completely dependent on the nursing service. We hoped we could sweep his friends and relatives out of the front door, because they were apt to be stumbled over, if they came to visit him too frequently. Students were ordinarily taught not to give the patients any information about themselves as individuals and not to waste time talking to the patients. Today we feel that nursing care is incomplete unless some provision is made for the patient to voice the things that really bother him, and the things of which he is apprehensive, so that the nurse, while she is giving physical care, can help to meet those needs herself, to give him a greater feeling of security, or refer the more complicated problems to other members in the team. It means we are seeing the patient today as representing a wide range of individual needs. We hope we will be able to prepare nurses to do those things that will contribute to the patient's recovery and to his improvement of health, whether he remains in the hospital or goes home as a member of his family group.

MRS. VAN ARSDALE: Miss Knapp, would you say that an industrial nurse or a public health nurse never made a diagnosis or never prescribed treatment?

MISS KNAPP: If she is very clever, she never does, but you have to learn how you can walk around and approach things from different angles without coming out, as we might say, flat-footed.

One of the physicians who used to give us lectures on communicable diseases said that no nurse makes a diagnosis, no nurse tells a patient what his diagnosis is, but unless a nurse is a reasonably good diagnostician, she can get into a great many difficulties. For example, in the public health field a nurse goes into the home, making a visit, and finds a child with a rash. She has to know pretty accurately whether the rash looks like scarlet fever or measles or something else before she calls up the health department and gets machinery set in motion to send a diagnostician out to the home. For if the fact is that the child has a sensitive skin and his mother used the wrong kind of soap on him this morning, the physician is going to be quite angry and irritated at this unnecessary trip.

I think the other fact we have to recognize is that the student nurse on night duty doesn't diagnose a patient's condition certainly.

but she has to be fairly well aware of symptoms and their significance in order to know when she has to call the night director in a hurry, or when she has to notify a physician to come down and look at the patient. Unless she knows that this is an unusual symptom or this is a serious symptom, she isn't going to know when to call for help. She isn't saying what the patient has wrong with him; she just knows that he has something quite wrong. I think that ordinarily in the public health field and in industrial nursing the nurse is protected by having some medical authority to whom she refers, even if the plant or the organization is too small for full-time medical care. She can, through the medical society in the city, through the medical society in the county, or from a physician who is retained, get standing orders, which tell her specifically what to do in the case of certain emergencies. Then as promptly as possible she reports that individual patient to the physician, so that he carries on the care, and she is protected (I hope Mr. Hayt would agree with this), because she has given just emergency care under standing orders, and the matter of diagnosing and prescribing continued treatment is the physician's responsibility.

MRS. VAN ARSDALE: Miss Knapp, for what acts of a nurse do you hold her responsible, and for what acts of a nurse do you consider a physician to be responsible?

MISS KNAPP: The way we try to interpret that to a group of inexperienced students is that we have general policies, which are embodied in certain procedures and certain ways in which we do things. As long as the student is carrying out procedures according to the method she has been taught and as long as she acts within that general framework, she is protected by the over-all responsibility assumed by the physician. I believe there is a simple illustration of that kind. If the student is taught that a hot water bottle is to be applied at 120 degrees, and if she decides she is in a hurry and just fills it out of a boiling tea kettle and doesn't bother to take the temperature, she is not carrying out the procedure she has been taught, and, therefore, she is individually more liable than if she were carrying out the procedure the way she has specifically been taught to do it and which, in our minds, provides the maximum of safety for the patient under the circumstances.

MRS. VAN ARSDALE: Thank you, Miss Knapp.

Mr. Hayt, do you have anything to add to that, or do you agree with it?

MR. HAYT: We have been getting along beautifully all day, and I would not think of disagreeing with her.

MRS. VAN ARSDALE: A practical aspect of this discussion is the part of the hospital administrator in determining which functions in a hospital should be handled by physicians and which by nurses. Within the hospital, Dr. Groeschel, how is a nursing function determined?

Dr. Groeschel: The question immediately poses a question, Mrs. Van Arsdale, I wonder what hospital you refer to. "Within the hospital," the question reads. Hospitals vary, vary tremendously, as we all know, in their organization and in the extent and character of the control and supervision that is exercised over individual nurses by the head of the nursing service and over individual physicians by the medical board. In general, however, in most hospitals there are two types of nursing functions: One, the routine function and the other, the special function, which involves special situations and specific, individual patients.

With respect to the routine function in many hospitals an effort is made to determine definitely what the nurse's function is and how it is delineated. For example, a new procedure will be set up as the result of research in a certain hospital, and as a result of setting it up the physician immediately requires assistance. The nursing service immediately asks for guidance in the matter of what is the nurse's function in this new procedure, how far does she go in the completion of it, where does she stop and the physician start?

Questions of that sort in many hospitals are referred to a committee on nursing procedures and practices. In our hospital such a committee exists, and it will take such a question and study it and come up with recommendations, which reflect the considered judgment of the representatives of the various nursing departments. When that committee has made its recommendations, it will refer the matter to the medical advisory committee to nursing. It is a medical committee composed entirely of physicians, with a single nurse, the chairman of the committee on nursing practices and procedures, also sitting in as a member. This special committee of the medical board will consider it and make its recommendations and send them to the medical board for approval, and the medical board exercising final authority either approves or disapproves the recommendations. In that way, as certain functions or certain duties or jobs arise, and there is a need for determining what the nurse's function is in them, it is defined.

Most nurses in hospitals are occupied in taking care of special situations, involving particular patients. Obviously, it is impossible to get a nursing procedure manual that will cover all of the situations that will arise. As a result, certain functions are allotted to nurses involving special, individual situations with individual patients, and the procedure is outlined by the physician in charge. Actually, it is very difficult to determine where some of these functions begin and where they end. For example, a patient with an abdominal condition might, as a result of an operation, have a draining sinus. Initially, the physician will feel that the sinus must be irrigated at regular intervals. Until the sinus is well established, he will do the irrigation himself, inserting a tube and using a certain amount of pressure in inserting the irrigating solution. But after the sinus has been well established, he may well turn the regular irrigations of it over to the nurse, who has observed and been instructed by him in the technic of doing that one particular job for that individual patient.

MRS. VAN ARSDALE: Within your hospital, how is what is a medical function determined?

DR. GROESCHEL: This is a matter that requires much less formality in answering than the previous question, namely, how is a nursing function determined. As Mr. Hayt mentioned, the physician is given a wide latitude in what he does for the patient. The physician's functions include all of those of the nurse, should he choose to exercise them. However, the nurse cannot perform all of the functions of the physician. In many respects it is a one way street. We rarely have the problem of trying to define what is a medical function, except as a matter of exclusion. When a new procedure comes up, it is studied, the part that the physician must perform is outlined, or the part that the nurse can perform safely and properly with instruction is outlined, and then the remainder must be left to the physician. So what is a medical function is frequently arrived at by the process of exclusion.

MRS. VAN ARSDALE: You think this varies from hospital to hospital?

DR. GROESCHEL: It varies tremendously. It not only varies from one hospital to another, but it also will vary within the same hospital. It will vary from one physician to another within the same hospital and from patient to patient within the practice of a single physician.

MRS. VAN ARSDALE: Is it possible to draw a line between the marginal functions of nurses and physicians? Does this vary from hospital to hospital?

DR. GROESCHEL: Obviously, as we have attempted to explain, it is impossible to draw a practical line of demarcation between the marginal functions of the nurses and the physicians. That line is constantly changing, as Miss Knapp and Mr. Hayt brought out, and as will probably be brought out by the other physicians on the panel. It is impossible to draw a line between the marginal functions of nurses and physicians.

MRS. VAN ARSDALE: What would be the result if we attempted to draw an arbitrary line between the functions of the nurse and the functions of the physician?

DR. GROESCHEL: Actually, I am afraid that it would have a bad effect. In certain situations I could imagine a very definite impeding of medical progress. As new technics are developed, there is a constant need for reviewing the nurse's functions and the physician's functions, and a constant need for the physician to try to determine what part of any particular procedure can be turned over to the nurse. As Miss Knapp has mentioned, the scope of the nurse's activities is increasing every year. If one were to look back fifteen or twenty years at what the nurse was expected to know and do then and compare that with what she is expected to know and do now, one would be amazed. It is a complete change, and it changes from week to week; it changes from day to day. Any attempt to draw an arbitrary line for however short a time would definitely impede the progress of medicine and would wind up hurting the patient—in hurting the patient because the services could not be provided for him. If there is one criterion that should be used in the consideration of any of these subjects, it should be that the welfare of the patient is first and foremost.

MRS. VAN ARSDALE: How much does the determination of what is a medical or a nursing function depend on the individual opinion of the staff member?

DR. GROESCHEL: It will vary a great deal. The determination of special nursing procedures with individual patients, not routines, but special procedures for individual patients, will vary considerably with the opinion of the staff member. Some physicians and surgeons have become quite confident of the nurse's ability to carry out quite involved procedures when the nurse has been trained to work with them over a long time. Others will always insist on carrying out such procedures themselves. It is in this area of special procedures for individual patients that the opinion of the staff member really operates, not in the routines.

MRS. VAN ARSDALE: Thank you, Dr. Groeschel.

We will now try to attack the problem from the standpoint of the surgeon.

Dr. Walton, would you say that a nurse who gives prediagnostic medication routinely is practicing nursing?

DR. WALTON: I think most of these questions that are put to me can be answered by "Yes" and "No," and my answer to this first question is "Yes."

MRS. VAN ARSDALE: What of the nurse who gives preanesthetic medication?

DR. WALTON: I think the nurse who is giving preanesthetic medication is carrying out a nursing procedure.

MRS. VAN ARSDALE: What of the nurse who applies physical therapy?

DR. WALTON: I think the nurse who applies physical therapy is merely carrying out some of the advanced procedures or some postgraduate work in connection with nursing.

MRS. VAN ARSDALE: Is the nurse who makes laboratory analyses performing a diagnostic function?

DR. WALTON: There are certain features in laboratory analyses that are diagnostic functions, and that is a very "iffy" question. There are certain technicians who do not have a nursing background who can carry out certain types of laboratory analyses. On the other hand, there are several procedures that require a nursing background in order to make them applicable.

Mrs. Van Arsdale: Would you say that the nurse who gives p.r.n. medication is practicing nursing, even though she must make an evaluation of the patient's condition?

Dr. Walton: Yes, I think the nurse who has to give the p.r.n. medication is probably practicing one of the highest types of applied nursing. For example, I think the largest dosage of morphine that is probably given in this day and age is 0.015 Gm., and whatever is left, pro re nata, it is left up to the nurse's discretion. Now, I was more or less amazed many years ago, when I made some calls with my father, to find he never carried anything less than a half a grain of morphine with him when he made a house call. I told my father that I learned in pharmacology that the dosage of morphine was an eighth, and he raised his eyebrows and said, "Well, son, an eighth will not do anything to a person who is hurting real bad, and I can't make another call and drive five miles to give the patient another eighth or quarter of morphine. He needs a half a grain." Then, I would say, "Well, what happens if you have a child?" And I can remember to this day how he would say, "You do it this way." And he would take his spoon out and take his knife out and chip a little off and say, "That's a child's dose."

Now, my father was practicing nursing in a practical sort of fashion, although he was a general practitioner. Seriously, I believe that the leeway that is given the head nurse to administer drugs as p.r.n. medication, in which it is necessary for her to make an evaluation rather than a diagnosis, an evaluation of the patient's condition, is something that must always belong to the nursing profession.

Mrs. Van Arsdale: In your opinion, which persons in the operating room are practicing surgery as a branch of medicine, and which are practicing nursing?

Dr. Walton: I would like to go back to Miss Knapp's very lucid definition of modern procedures and consider an operation as the result of teamwork at the nth degree. It is even referred to, as you well know, as a surgical team, and I don't think that we have any finer example in medicine in which teamwork plays a greater part.

From a legal standpoint, and I believe Mr. Hayt will agree, the operating surgeon is the only individual who is actually practicing surgery because he is charged with the responsibility. On the other hand, no one can minimize the role of the first assistant or the second assistant or the scrub nurse or the circulating nurse or the anesthetist. They all are absolutely essential and play a very, very important role, but from a technical standpoint I should say that the only individual practicing surgery is the operating surgeon.

Mrs. Van Arsdale: If a nurse assists the surgeon within the cavity of the wound, is she practicing medicine?

Dr. Walton: No, I think she is assisting the surgeon who assumes that responsibility. I think that is true from a legal standpoint, and I think that in all instances when nurses act as first assistants to surgeons they are following their directions, just as they are following a direction that is written in the book on the ward.

Mrs. Van Arsdale: Is the first surgical assistant practicing surgery?

Dr. Walton: No, I think the first surgical assistant, much to his disgust, is not practicing surgery. The most hypercritical individual at the operating table is the intern. Then up the stage comes the second assistant, then the first assistant, and then, finally, the man who is doing the work. The intern's reaction is, "If he would only move over and let me get in there, I would show him how to do it."

Seriously, I believe that the first surgical assistant is practicing surgery only in that he is following out some instructions that the surgeon is giving him.

I had a very interesting experience in Glasgow, some twelve or fifteen years ago, that illustrates this point of responsibility. One of our visiting fellows in 1932 was a Scotchman by the name of Arthur Mackey, whom some of you may know. Mr. Mackey went back to Mr. Archibald Young's clinic at the University of Glasgow, and I had the privilege of visiting him. I watched Mr. Young do three operations. Then, by virtue of the fact that Mr. Young dropped out, Mr. Mackey took off his mask and took off his gloves and that made him the operating surgeon, because in that particular clinic the badge of the surgeon was the absence of the mask and the absence of gloves. The first assistant wore a mask, the second assistant wore a mask and gloves, but the surgeon took them off. So I think you can see that that is really a relative thing; it is a question of responsibility.

Mrs. Van Arsdale: Do you have any other distinctions to mention, besides the taking off of the gloves and the mask?

Dr. Walton: There are a few others I might mention, but I don't believe this quite the place to do it.

Mrs. Van Arsdale: When a physician assists an attending physician or surgeon in the care of a patient, who is ultimately responsible?

Dr. Walton: I think that both legally and morally the surgeon is responsible at all times for the care of the patient. He may call in many other individuals in consultation, but it is still his great responsibility, and that is one of the weak points, it seems to me, of modern medicine. If I might digress just for a moment, in so many institutions today the general practitioner will call in a surgeon to operate on the patient, and the minute the last suture is tied, the surgeon drops out of the picture. The patient is cared for by another doctor, regardless of how much difficulty he gets into, and the so-called surgeon sheds his responsibility like the skin of a snake.

Mrs. Van Arsdale: When a nurse assists a physician in the care of a patient, who is ultimately responsible, or do you feel that you have answered that?

Dr. Walton: I still feel that the surgeon has the moral, as well as the legal, responsibility in the care of the patient.

Mrs. Van Arsdale: Thank you, Dr. Walton.

Mr. Hayt, do you agree with Dr. Walton?

Mr. Hayt: Well, I think that the doctor has made a correct legal diagnosis.

Mrs. Van Arsdale: At this time, I would like to call upon all members of the panel for any suggestions or comments they may have, and I would like to ask them: Can it be said that every subsidiary function in medical or surgical practice—in the total care of the patient—is performed on the actual or implied direction of a physician? Is that physician the attending physician, the hospital medical staff as a class, or physicians as a class?

Dr. Groeschel, have you anything to say about that?

Dr. Groeschel: I repeat: Can it be said that every subsidiary function in medical or surgical practice—in the total care of the patient—is performed on the actual or implied direction of a physician?

I believe, obviously, yes.

Is that physician the attending physician, the hospital medical staff as a class, or physicians as a class?

I would say that of routine functions, which would be performed by persons other than physicians, it might well be that the physician is the hospital medical staff or physicians as a class. As to special functions for individual patients, I believe it would be the attending physician.

Mrs. Van Arsdale: Dr. Walton, do you have anything to say on that subject?

Dr. Walton: I don't believe so.

Mrs. Van Arsdale: Dr. Lundy?

Dr. Lundy: I would rather stick to medicine. The law is on my right.

Mrs. Van Arsdale: From the foregoing discussion we have arrived at some answers to the questions, what is the practice of medicine, and what is the practice of nursing.

Now, we would like to ask Dr. Lundy for his definition of the practice of anesthesia.

Dr. Lundy: Mrs. Van Arsdale, before I attempt to answer the questions that are being put to me, I should like to take this opportunity to express my admiration for the nurse anesthetist. I feel that she has really carried on over the years and has done the majority of the clinical work that was necessary in order for me to have a spot. If we go back to the days when the surgeon was the surgeon, and there was no anesthetist except the four strong men who held the patient on the table while he was operated on, we have come a long way. Someone had to administer the pain-relieving drugs that were introduced. To get the job done, you had to be there to do it. There is a great shortage today, and always has been, of individuals who are interested and willing to administer anesthetics.

I don't know how you folks feel about it, but with these people talking as they do, I feel that we are being peered at in some kind of a cage. They want to put us in a category. I don't see any necessity for a category. Why have a definition? We are the definition. You are the definition of what is a nurse anesthetist. Look at you, then, all kinds of folks, and that is the definition. It doesn't have to be put into words, because what would be true today, if you did get it into words, probably wouldn't be true tomorrow and certainly wasn't true twenty odd years ago. At any rate, I don't want to let this opportunity pass to tell you in what regard I hold the nurse anesthetist.

Now, I shall try to arrive at a definition of the practice of anesthesia. It seems to me that the practice of anesthesia is part of the practice of medicine, and that the practice of medicine is to heal disease. There are many things that might be brought out in that regard, and I shall read you something that you may have overlooked. It is from the *ASA News Letter* for November 1950.

> The American Medical Association was requested by the National Security Resources Board to assist it in preparing a definition of and statement of the duties of various medical specialists. The definition of an Anesthesiologist was referred to this society [American Society of Anesthesiologists] by the American Medical Association for assistance in its preparation.
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> A special committee of the ASA considered the question and drafted a definition and a statement of the duties of an Anesthesiologist, which we are informed has been accepted by the American Medical Association and in turn forwarded to the National Security Resources Board.
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> In the belief that Anesthesiologists are often in need of such a definition and statement, the one adopted by the AMA is set forth below:
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> "AN ANESTHESIOLOGIST: Is a doctor of medicine who is qualified to evaluate and manage the anesthesia requirements of a patient pre-operatively, operatively, and post-operatively, and to administer and supervise diagnostic and therapeutic blocks, inhalation, fluids, shock, and resuscitative therapy."
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> In an elaboration of this definition, the following were added: "The anesthesiologist's duties in the pre-operative period include an evaluation of the patient based upon the history, physical examination, and laboratory findings; selection of anesthetic agent, method, and recommendations for such other therapeutic procedures as will bring the patient to the operating room in his maximum physical state.
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> "The anesthetic management includes the administration of the anesthetic agent, obtaining and/or recording blood pressure, pulse, respiration, medications, and other pertinent data. In addition, he is responsible for the proper positioning and protection of the patient from physical harm, such as burns, pressure, etc. As a member of the surgical team, he communicates to the surgeon such information as is necessary for the well-being of the patient. He administers during this time all forms of resuscitative and supportive therapy.

> **"Post-operatively he is responsible for the safe return of the patient to his bed. At this time he checks the circulatory, respiratory, and central nervous functions, and makes such recommendations as are indicated, to suitable personnel for the management during this period. He then follows the patient's course, recommending such therapy as is indicated, such as suction bronchoscopy, therapeutic blocks, inhalation, fluid, and supportive therapy.**
>
> **"Because of his training, interest and experience, he is also qualified to provide consultive service for acute and chronic pain syndromes, respiratory and circulatory emergencies. He serves as a ready consultant in the field of practical pharmaco-physiological problems dealing with narcotics, analgesics, analeptics, inhalation agents, supportive, resuscitative and fluid therapy."**

And that is the definition that was forwarded to the Security Board.

MRS. VAN ARSDALE: Dr. Lundy, would you say that there is a difference between the practice of anesthesiology and the practice of anesthesia.

DR. LUNDY: When I was concerned with the formation of the certifying board in anesthesiology for physicians, it seemed that perhaps we could apply the word "anesthesiologist" to indicate the physician anesthetist and use the word "anesthetist" for those persons who simply administered anesthetics, whether they were physicians or nurses, whoever they might be, but who were not interested in research, in teaching, and in the development of new methods and agents. They simply administered two or three or four anesthetics daily in the operating room. Such persons, we thought, could properly be called "anesthetists." I notice that that distinction has been very kindly followed in your program. The nurse anesthetist is the nurse anesthetist, period. That is the definition; she speaks for herself. The anesthesiologists listed here are all M.D.'s, and I think that probably in time custom will establish that difference between the two words.

This enema business bothers me a little bit. I am afraid that in concocting that question somebody was referring only to ordinary soapsuds enemas, while actually the first thing that came into my mind was oil and ether by enema, avertin by enema, pentothal sodium enemas, and such other medications as are given by rectum, paraldehyde and what not. The question, it seemed to me, depended on who was reading it as to what it meant to that individual. Anyway, this enema business is different in different countries. I don't know whether you ever heard the story about the Englishman who visited our place. He was not acquainted with a hotel where the top floor is for operating rooms and the next two floors are the hospital and the rest of it is hotel. He went down and ordered his dinner, and the waitress said, "You must have our mock turtle soup." He said, "No, thank you." So she got the head waitress, and she insisted that he have the mock turtle soup, and he said, "No, thank you." So they got the manager of the hotel, and he came in and explained that this was a very special dish, and he must have it. The Englishman said, "I don't like soup, and I won't eat it." So they left him alone and he had his dinner. They had a nursing service to the hotel rooms, and someone had ordered an enema, and when he went upstairs, the nurse got into this fellow's room by mistake. But he was strange to this country, and he thought it was just part of the service there in the hotel, and so she gave him an enema.

Well, when he got back to England, they asked him to tell about his trip to America, and he said he would, but first he would like to make a remark. He said, "If you go over there, and they tell you to eat mock turtle soup, eat it, because they will give it to you one way or another."

I am tempted, with your permission, to read you a little excerpt from the *Lancet* of May 5, 1951.[1]

> A good anaesthetist is as skilful at protecting his surgeon from the effects of mental trauma as ne is at protecting his patient's nociceptors from the onslaughts of the surgeon. The satisfactory performance of this important psychological task calls for many godlike—or at any rate mythical—qualities in the anaesthetist. He must be as calm as Jupiter, as patient as Penelope, as punctual as Apollo, as resilient as Anteus, as versatile as Mercury, and on occasions as many-handed as Briareus. He must be ready to assume the role of porter, plumber, electrician, note-reader, brow-wiper, spectacle-polisher, table-adjuster, and fire-fighter at a moment's notice. He must suffer the little barbs of the surgeon with good humour, but be ready nevertheless to make such a spirited riposte as to keep the surgeon on his mettle. Clever sayings of the surgeon at the expense of the anaesthetist have a wide currency, and they do no harm. But the anaesthetist usually contents himself with remarking to his disciple "Of course you must protect the patient by adequate depth against surgery such as this"; or "What is the treatment of surgical shock occurring late in the second hour of a simple herniorrhaphy?"
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> But I recall one occasion when the anaesthetist let, as one might say, the gas out of the bag. The surgeon was operating on a foot to whose leg he had himself (somewhat inexpertly) applied a tourniquet. He was having great difficulty in finding a foreign body, and was the more incommoded by a constant ooze of purple blood. "Doctor," he said at last, "he seems very blue [at] my end." "I know," the anaesthetist replied gleefully, "I can get only a little oxygen past your tourniquet."
>
> When the surgeon reproaches the anaesthetist because, he says, the patient is bleeding (or not bleeding), or because he is coughing when he wants to sew up, or not coughing when he wants to find the hernia, or because the anus is so tight he can't get his finger in (or out), or so loose that he can't identify the sphincter, the requisite action is very simple. The anaesthetist expresses sympathetic concern, and ostentatiously makes some adjustment to his apparatus. As soon as the surgeon's attention is withdrawn the status quo may be restored. The suggestion, confidently made a few minutes later, that the nuisance has now abated invariably elicits the correct response.

MRS. VAN ARSDALE: Thank you, Dr. Lundy.

I would like to ask Dr. Bradley to summarize the discussion and to add any comments he has to make.

DR. BRADLEY: Thank you, Mrs. Van Arsdale.

Part of my summary is a recommendation that we invite Dr. Lundy for a return engagement.

We have skirted the second objective of this forum, and I should like to try to focus attention on whose responsibility it is to train the nurse anesthetist. It is obvious that the administration of anesthesia under the direction of the surgeon, excluding such things as bronchoscopies, which were in the definition that Dr. Lundy read to us, is in the province of nursing.

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[1] In England Now. Lancet 1:1014-1015, May 5, 1951.

Why is it, then, that schools of nursing have not interested themselves in the education of the nurse anesthetist at the postgraduate level? Later on I hope Miss Knapp will speak to that and perhaps other members of the panel. The truth of the matter is that the education of the nurse anesthetist has been in the hands of the surgeon. It has been in the hands of the hospital departments of surgery.

If in this nursing function, the administration of anesthesia, the anesthetist is an ancillary aid or a physician's assistant, what would prevent a medical school from collaborating with the department of surgery and the hospital in making this a subspecialty of medicine as far as education is concerned?

MRS. VAN ARSDALE: Miss Knapp, I think that is a leading question for you. You wish to answer it?

MISS KNAPP: It is always a lot of fun just to take a flyer into the blue and draw an outline of how everything should be in the future to solve our present problems. I think, however, most of you appreciate the fact that you have gone through a real pioneering stage, during which each center that found nurse anesthetists were needed tried to do as good a job as possible. There is a time in the development of various advanced programs for nursing when it may be necessary to formalize them to some extent. I don't know whether that moment is arriving for your own group. You may find that the policies and the programs differ widely in various parts of the country, so that those who have devoted a certain amount of time and effort to taking a course in one section of the country might find that they are not properly qualified when they cross state lines. About that time it may be necessary to see what can be done through your national organization to establish national patterns and perhaps to make arrangements with educational institutions to carry out some of those programs for your members and your potential members.

When we speak of formalized education, we know that in most advanced programs on the graduate nurse level we need certain subjects, which can be secured through other divisions of a college or university. However, no preparation for a graduate nurse in any specialty is complete unless she has a chance to practice and apply what she gets from formal classes. In other words, in the course for a head nurse or a supervisor or a public health nurse or an industrial nurse or an instructor in a school of nursing, all such formal programs leading towards a degree would include supervised experience for the individual, so that she can demonstrate to herself, and to others, that she has the qualifications in her own area of specialization. I think that that is something that might be coming in your own group. At this time you probably realize that we are questioning how far hospitals may be able to expand educational programs for basic education. Some hospital administrators want to get rid of the financial burden of operating schools of nursing. I throw that out as a suggestion: whether at this time the hospital is a place to center the education for your own group, or whether it might be the place for clinical experience and practice, but not necessarily the place that would carry the burden of the more formal aspects of the education.

Mrs. Van Arsdale: Thank you, Miss Knapp.

Dr. Lundy, have you any suggestions or comments to make?

Dr. Lundy: I suppose about all I can do is to defend my own way of life. What is good in one place may be no good in another. So far as I am concerned, this association has been lifting itself by its own bootstraps in forcing persons who wish to become members of the organization to pass certain formal examinations. In our training of the nurse anesthetist—and we have quite a few to train right along for our own needs—we try to prepare her or him to pass the examinations of your organization, so that that person gets the stamp of approval.

We also try to train the nurse anesthetist so that she will perform satisfactorily in the operating room, both to the satisfaction of the surgeon and to the satisfaction of the physician who is in charge of the anesthesia in that particular hospital. She goes to seminars along with three-year fellows in anesthesiology. We also have a special set of lectures we have to give in order to meet the requirements of this organization, and two or three of the men on the anesthesiology staff or consultants give those lectures. We found out that we couldn't satisfactorily have lectures given by physicians who were themselves students. It just didn't work out.

There are a few meetings that the nurse anesthetists do not attend because they have to be kept small, and since we can't get along with less than fifty nurse anesthetists and since we have about thirty doctors, the group gets too large for certain discussions of research. For example, when a man who is spending nine months on his problem explains what he is trying to do and how far he has gone with it, and everybody else tries to pick him apart, you have to have it a relatively small group. We also have a Journal Club to which the nurses can but are not compelled to go. So that, generally speaking, we are trying to keep abreast of the times and give these students all the education that we can. The facilities that are available to us are unique, I think. The facilities are about as Miss Knapp has suggested; they are practically of university caliber. Regardless of what you wish to have taught, there is someone who is an authority on it, whether it be physics or chemistry or physiology or what not. The facilities are there. While it is probably somewhat of an experiment within our own institution, I believe that Miss Knapp is right, that the formalized part of the training should be given at a university level.

Mrs. Van Arsdale: Thank you, Dr. Lundy.

Dr. Groeschel has a school for nurse anesthetists at his hospital. Maybe he would like to tell us something.

Dr. Groeschel: We do have a school for nurse anesthetists, and the instructor is Mrs. McCoy, who, I believe, is present at this meeting.

We depend very heavily upon our nurse anesthetists. Our school trains them, and many of the people who finish stay with us. We look to the school for new replacements each year. The performance of our nurse anesthetists has been very satisfactory. We feel that the school operated by the hospital is doing an excellent job.

I feel that I have relatively little to add to what Miss Knapp and Dr. Lundy have said about the educational aspect of the subject, except that our school is perhaps typical of the usual hospital-operated schools for nurse anesthetists, and we are very happy with it.

I do believe that there lies in the future a question that may well have to be answered one day, that is, will we be able to afford the luxury of having nurses trained as anesthetists. With the shortage of nurses, which keeps getting more acute all the time, and with no satisfactory answer, at least up to this time, to the situation in terms of increased nurses for increased nursing jobs, I wonder if we may well have to forego the luxury of having nurses who will be trained as nurse anesthetists and perhaps take people into schools of anesthesia after they have completed certain educational requirements and train anesthesia technicians. I say this in a situation where I have already been warned that it might not be the right thing to say. I say it, not that I want it, nor would I applaud such a move, but I do wish to point out that patients must be taken care of. We need people to take care of them and to perform certain functions alongside the physicians and surgeons who are responsible for the definitive medical and surgical care. The problem is, where are these people going to come from? We are already short of nurses. In certain situations people with certain minimum standards of education are being trained right now as operating room technicians. In one of the largest cities in this country the department of hospitals has embarked on such a program because it hasn't enough nurses to use in its operating rooms as suture nurses. It is training operating room technicians, giving them basic courses in the elements of sterility, the use of instruments, and operating room technic.

Again, I throw this question out to this audience, not because I like it, not because I favor it, but merely to stimulate your thinking along the line that we must satisfy the needs of patients everywhere in this country for services, and the number of nurses available for all of the positions is obviously restricted. Does it mean that some time we may be forced to the issue of non-nurse anesthesia technicians?

Mrs. Van Arsdale: As many of our group know, Dr. Groechel's suggestion has been made to this group before, and it was not met with much favor at that time. However, I think we would like to have an opinion from Dr. Walton. He should be vitally interested in a situation such as that. Dr. Walton.

Dr. Walton: There is no use for me to repeat the fact that we are woefully short of both nurses and nurse anesthetists. Perhaps my conception of this entire problem is wrong, but I have always thought of a career in nursing as an extremely interesting educational experience. For example, some young ladies who finish in the upper third of their high school classes, after having met certain physical requirements, and after having been interviewed and their desirability for the nursing profession determined, elect to participate three years in a school of nursing rather than to have two years, shall we say, in a junior college or four years in another college, and at the end of their third year they presumably graduate, pass their state boards, nurse a month or two, and get married. I don't think that anyone can find any fault with that particular plan. But that unfortunately does occur, and we lose a great many from the practical standpoint through that particular mechanism. Perhaps we should make our nursing and nurse anesthesia programs a bit more attractive so that we can attract more young women. Certainly, the junior colleges and the other secondary schools are just as full today as they have ever been, if not fuller. The girls still like advanced education, as well as the boys.

My feeling about nurse anesthetists and our finer scrub nurses is that they are, in effect, our postgraduate students, and I have always considered them as that.

It seems to me that we could go out on the limb in the other direction, a little to the reverse of the preceding speaker, and without too great a stretch of the imagination visualize centers where selected candidates for advanced training in anesthesia might take their basic work at a university level and receive not only this training but a degree as well. Let them receive a degree in anesthesiology. It doesn't matter whether it is a bachelor's degree or a master's degree, but let them have academic recognition. It just doesn't seem right in one particular locality to have a school of nursing where we have paid teachers, to have a school of medicine where we have individuals who have devoted a lot of time to physiology and pharmacology and anatomy, and yet to have the students in the school of anesthesia taught by an entirely different group! It seems to me that there might be some co-ordination among those teaching forces to give the nurse anesthetists a little better basic training, which, in turn, might eventually place them on a degree basis.

Mrs. Van Arsdale: Dr. Bradley, do you have anything to add?

Dr. Bradley: My purpose in bringing this matter of education before you is that you are engaged on an accreditation program and a curriculum structure study, and I think these remarks will be of considerable assistance to you as members and to your accreditation committees. I also bring it up to give warning to nurse educators. Miss Knapp is on the Joint Commission for the Improvement of Patient Care, where she has contact with all the nursing organizations and the heads of the A.M.A. and of the American Hospital Association. I regret very much that we do not have a dean of a medical school here.

I do have some technical points that I should like to speak to you about, and one is the difficulty of getting ancillary help. Every time we transfer a function in the hospital performed by a professional group, usually nursing, to a nonprofessional group, we run into trouble evenings and nights. The dietary department doesn't work nights, the laboratory department doesn't work nights, and it is only recently that some of us in hospital administration have been getting the superintendent's office to work nights, Sundays, and holidays and not throw administrative responsibility in the laps of the Miss Knapps at 5 o'clock in the evening and come back and get it at 9 o'clock in the morning.

I am also somewhat critical—and this is not pointed at Miss Knapp—of faculties of schools of nursing who do not work evenings, nights, Sundays, or holidays. If we who are the professional leaders—hospital superintendents, physicians, nurse educators—are going to get a following, we must work right alongside of those people. I am afraid to turn the hospital over to the subsidiary groups. I know of a country hospital that is having a big scrap because the attendants are unionized, and they will not recognize the superintendent of nurses in that hospital; they have a superintendent of attendants and a superintendent of nurses, and "helzapoppin'." The ancillary workers are likely to unionize.

Another point that I should like to bring up, and it was brought to my attention by Dr. Groeschel, is that when the physician develops something that is to become a new nursing technic, we, through lack of understanding and because we are busy, fail to help the faculty of the school of nursing work out the curriculum mechanics to put the new procedure into the curriculum. This results in considerable embarrassment to the faculty of the school of nursing. The physician is demanding the technic, no curriculum has been set up to teach it, and the physician is critical.

I should like to end my comments with this note: You women are doing a fine job. You are here because the physicians want you here, and all you need to do to prosper is to continue to work. That is all you need to do. (Applause)

MRS. VAN ARSDALE: Do any of the other members of the panel have any comments to make?

Miss Knapp: In finding the best way of educating individuals for professional service, we are trying at this time to determine not what a nurse does—for that covers everything, including the fact that she serves as a nurse anesthetist—but to find out what nursing services a patient needs, and then to divide those many services into those that require professional skill, those that could be done by a trained, well supervised practical nurse, and those that could be assumed by a clerical worker or some other individual. Is three years of nursing training absolutely essential as a foundation for a nurse anesthetist? Or could we in three years qualify a high school graduate to be a better nurse anesthetist than we are doing at the present time with the four year course, which amounts to three years basic nursing plus one additional year. You probably feel the way I do, it is much easier to get along with old ideas than it is to crowd them out with new ones.

I would like to give you one little illustration of a person who stuck very definitely to the old ideas. A nurse I knew had done mission work in India, and she said their hospital was very poorly equipped. The laundry had to be taken by one of the native workers in a cart drawn by bullocks down to the nearest stream, and the sheets and the nurses' uniforms were slapped around on the rocks and washed and brought back to the hospital. Most of the laundry was just rough dried. She said as the years went on they finally got enough money to drill a well in the courtyard of the hospital. And they told the worker that now they had the trough and that he could wash the linen at this long trough in the courtyard instead of taking it in the cart down to the stream. The first day, they were very much amazed to find that he was standing in a tub of water to do the laundry. When they asked him why, he said that he always stood in water up to his knees when he did the laundry. Let's not be that kind of individual.

Mrs. Van Arsdale: Thank you, Miss Knapp.

I think we have covered the subject assigned to us fairly well. Mr. Hayt has a final comment to make.

Mr. Hayt: I think you will all be interested to know how safe nurse anesthesia is. Before coming here I wrote to the insurance company with which some of you have liability insurance to find out (1) the number of claims made against nurse anesthetists during 1950 and 1951, (2) the number of such claims that resulted in suits, and (3) the total amount paid out on claims or judgments.

The reply indicated that during 1950-51 six claims were made, none resulted in a suit, and all that the insurance company paid out was $160.

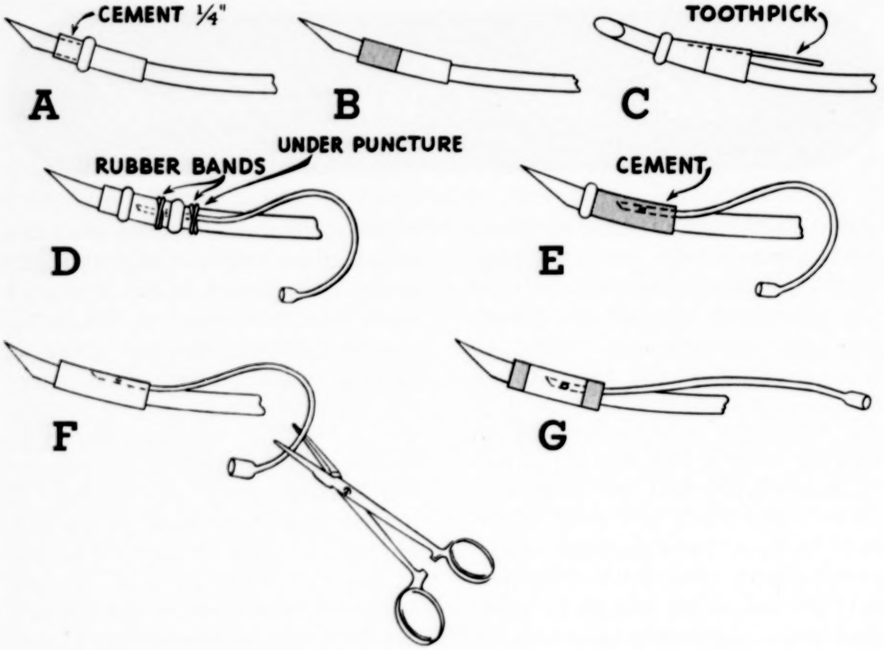
Dr. Lundy: As Oliver Wendell Holmes said, when Morton wrote him and thanked him for the word "anesthesia," "Don't thank me. Everybody likes to have a hand in a grand success." So I am very pleased to have had a hand in this.

Notes and Case Reports

AN INEXPENSIVE EASY-TO-MAKE INFLATABLE CUFF FOR INTRATRACHEAL TUBES.—Balloon cuffs of one design or another have been used on intratracheal tubes almost as long as the tubes themselves have been used. Frequently, the necessary articles needed for making such a cuff are supposedly unavailable, and only commercially made cuffs are used. However, I have been making inflatable balloon cuffs for a long time that are relatively simple to make and from materials that are always available. This inexpensive cuff has proved to be quite satisfactory and can be used on any average size intratracheal tube, that is, 32 to 38F. If the cuff is to be used with a larger or smaller tube, the size of the materials used can be altered accordingly.

The intratracheal tube to be cuffed is used instead of a form tube in the manufacture of the cuff. Two pieces of ⅜ inch (0.9 cm.) Penrose tubing, which are 2⅜ inches long, are used for the making of the balloon. One piece serves as the balloon foundation. These two pieces of Penrose tubing are slipped onto the beveled end of the intratracheal tube with the aid of a little glove powder. This may be done either by slipping on one piece at a time, or by putting one piece of tubing inside the other and slipping the two pieces on together. These two pieces of Penrose tubing are then adjusted so that the edges are together, the lower edges being ¼ inch from the bevel of the intratracheal tube. The top piece of tubing is then rolled away from the bevel about half of its length, and a band of rubber cement ⅜ inch wide is applied to the edge of the bottom piece of tubing. A plastic toothpick aids in spreading the cement evenly. The top tubing is then allowed to roll back onto the cement and pressed firmly into place with the thumb and forefinger (figure, *A* and *B*). The free end of the top tubing is then rolled back on itself towards the bevel end of the tube just to the cemented margin. The plastic toothpick, previously used for spreading the cement, is then slipped under the free end of the bottom piece of tubing to a point ½ inch from the edge of the tubing and about half way between the side of the intratracheal tube away from the bevel and the top (inside curvature) of the tube. This point is then pierced with the toothpick (figure, C).

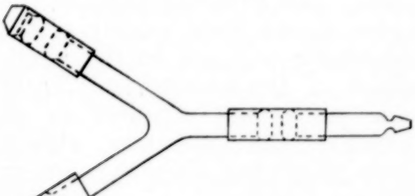
The round end of an 8 F. urethral catheter is cut off at an angle of 60 degrees. One small hole is cut on each side of the catheter ⅛ inch (0.3 cm.) away from the bevel. The beveled end of the urethral catheter is then slipped under the edge of the foundation piece of tubing onto



the toothpick and pulled with the toothpick through the pierced hole for a distance of 1 inch (2.5 cm.). It is important that the beveled end of the catheter be turned away from the form tube. A small section of ⅜ inch Penrose tubing, about ⅛ inch (0.3 cm.) wide, is now slipped over the end of the form tube and over the catheter and then cemented over the catheter and onto the covered form tube close to the bevel of the catheter (figure, *D*). This rubber band thus holds the catheter in place on the inside after the balloon is finished. The free edge of the foundation tubing is now rolled back to the catheter junction, and a similar rubber band is likewise cemented over the catheter under the foundation tubing to anchor the catheter to the intratracheal tube (figure, *D*). The tubing is then allowed to roll back and stick to the excess cement about the rubber band. The 1 inch length of catheter is now cemented to the foundation Penrose tubing with a generous amount of cement (figure, *E*). When dry, the exposed areas of cement are dusted with glove powder to prevent the balloon from sticking at undesired points. Excess powder is blown away.

A ⅜ inch band of rubber cement is now painted around the free edge of the foundation tubing. The top tubing is then allowed to roll back into place as previously done at the bevel end and firmly pressed into place. A small amount of air is now injected into the balloon through the catheter with a 10 cc. syringe, and any undesired points are freed from sticking. A smooth hemostat is then clamped along the catheter to the margin of the free balloon space (figure, *F*). The finished balloon is lightly dusted with glove powder and allowed to dry undisturbed for ten to twelve hours. It can then be thoroughly tested for leaks and sterilized for use with either alcohol 70 per cent or aqueous zephrian 1:1,000. The completed balloon is very similar to a standard commercially made balloon (figure, *G*). — CAPT. JENNIE P. BENEFIEL, ANC, Camp Atterbury, Ind.

A SIMPLE Y-TUBE FOR MULTIPLE INTRAVENOUS THERAPY.—The anesthetist often finds it necessary during extensive major operations to administer multiple fluids simultaneously by vein and yet has only one or two veins available for such multiple therapy. To overcome this difficulty, I devised the following gadget.



An ordinary small glass Y-tube is used, onto which a glass needle adaptor is attached to the single end of the Y by means of a short length of intravenous tubing. To the Y ends are attached open needle hubs, also by means of short lengths of intravenous tubing. Thus, by using either a 17 or 15 gage intravenous needle for the venipuncture, and a three way stopcock on a tubing for administering pentothal sodium, two or three different fluids may be administered simultaneously. I have found this gadget especially valuable for war casualties to whom whole blood, procaine in saline solution, and pentothal sodium are being given all at once.

To close up one of the Y ends while more fluid is being prepared for addition, the tip of a 30 cc. syringe that has been plugged with solder works fine. For the single end, a soldered needle hub does the trick.—CAPT. JENNIE P. BENEFIEL, ANC, Camp Atterbury, Ind.

BURNS

(Continued from page 31)

for use during the operation. Full thickness burns of the face frequently require tracheotomy, because scarring about the mouth makes insertion of an intratracheal tube mechanically difficult. Early administration of blood during all grafting procedures is recommended, because blood loss during the operation is usually encountered within the first thirty minutes of the procedure. The use of a Turkel bone marrow needle is suggested for the administration of blood when suitable veins are not available. The importance of keeping the patient well anesthetized during the application of the dressing over new grafted areas is emphasized.

Legislation

Patient Must Prove Cause of Injuries to Nerve Roots During Anesthesia Administration.[1] — The action was instituted against a surgeon and an anesthetist for malpractice, arising out of an emergency operation for an obstruction to the common bile duct. Spinal anesthesia was selected by the physicians; the anesthetic was administered through a needle inserted between the second and third lumbar vertebrae. During the operation gas-oxygen-ether was used to supplement the spinal anesthetic.

The patient testified that he was placed upon the operating table and assumed a "curled up" position to receive the anesthesia. He stated he "felt this jabbing of pain into my spinal column, and from that point on I had this terrific pain radiating down my right leg, such as a heavy electrical shock. I remember stiffening out and screaming; from that point on I fainted and do not know what happened until the next morning in bed." The next morning he could not move his right leg, and partial paralysis, atrophy, and sensory changes in his leg and adjacent organs persisted.

An expert anesthetist testified that the pain was caused by the needle striking the nerve roots; the recognized procedure is for the anesthetist to try to determine what caused the unconsciousness, and further action would depend on what he learns. Another expert stated the injury was a cauda equinal neuritis produced by the spinal anesthesia; the nerve roots were injured down to the fifth sacral root. He further said that the anesthetic agent had a toxic effect on these nerve roots and caused the resultant paralysis, atrophy, and sensory changes. The unfavorable reaction of the patient, said another expert, could not be predetermined and was one of the hazards of anesthesia, producing "arachnoiditis," which is an inflammation about the spinal cord.

It is beyond dispute, declared the court, that the cause of the injury to the nerve roots and its effect upon the leg and adjacent organs must be explained by experts. The evidence ascribed the cause to the toxic quality of the anesthetic and not to the negligence of the anesthetist. There was no expert opinion as to whether the operation should have proceeded after the patient lost consciousness, or whether it should have been stopped. It is axiomatic that a jury should not be permitted to hazard a guess. "Seldom, indeed, would physicians administer a spinal anesthetic if they are to be held responsible solely for an adverse reaction of the anesthetic on the nerve roots." Case was dismissed.
—EMANUEL HAYT, LL.B., Counsel for A.A.N.A.

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[1] Ayers v. Parry, et al., 19 C.C.Neg.Cases 902 (U.S.D.C.,N.J).

Abstracts

SMALL, G. A.: **Brachial plexus block anesthesia in children. J.A.M.A. 147:1648-1651, Dec. 22, 1951.**

"The literature has commonly indicated that children are poor subjects for local anesthesia because of the difficulty in obtaining their cooperation and because they may sustain serious psychic trauma during the procedure. That this is not a universal attitude is manifested by a number of articles which suggest that children are suitable subjects for brachial plexus block. The following is a report of the program pursued in the management of 151 brachial plexus block anesthesias performed on 150 children . . . Attention to the several psychological, pharmacologic, and anatomic considerations involved are most important to the success of the method. . . . The anesthetic solution used in this series was prepared as follows: to 42.5 cc. of sterile saline solution was added one 5-cc. ampoule of 20% procaine hydrochloride solution (1.0 gm.), one 2-cc. ampoule of 1% tetracaine (pontocaine) hydrochloride solution (20 mg.), and 0.5 cc. of 1:1,000 epinephrine (adrenalin) hydrochloride solution. The resulting solution then consisted of 50 cc. of 2% procaine hydrochloride and 0.04% tetracaine with 1:100,000 epinephrine. The total amount of solution injected varied with the age and size of the subject. . . .

"A short observation period during which one endeavors to appraise the child, and to develop a friendly relationship is the first step in a brachial plexus anesthesia. . . . One hundred and twenty-four blocks were performed by the supraclavicular route. . . . The remaining 27 blocks were induced by a modification of the axillary approach. . . The youngest of this group of 150 children was 15 mo. old and the oldest was 12 yr. old. . . . All of these children except three had acute traumatic conditions; those three had chronic lesions requiring surgical treatment. . . . In 125 patients the results were very good. The preliminary attainment of rapport was most satisfactory in these children; premedication induced a state of drowsy unconcern or light sleep during which the brachial block was accomplished with facility and the operative procedure progressed without the slightest evidence of discomfort from the patient. . . .

"In 12 patients the results were good. In these children the brachial plexus anesthesia was as good as in the first group, but the preliminary interview and premedication were not completely satisfactory. . . . After the onset of anesthesia, and during operation, there was complete cooperation from the patient. In six patients the results were fair. . . . These six children were very apprehensive and fearful before being premedicated, but after the operation each confessed that the discomfort had been less than he feared it would be. In the remaining eight patients brachial plexus block anesthesia failed . . . The shortest anesthesia obtained was about 50 min. and the longest noted by personal observation was three hours and 45 min. . . . Complications encountered in this study consisted of four small hematomas which were asymptomatic and subsided rapidly; there were three instances of Horner's syndrome which subsided with the anesthesia; in one child a rectal temperature of 102 F. developed, accompanied by a four-hour period of hyperpnea postoperatively. This was thought to be due to some atelectasis from respiratory depression resulting from overzealous premedication; recovery was uneventful; a chest x-ray next day was normal. An increase in heart rate was observed in each case; this occurred irrespective of the inclusion of atropine or scopolamine in the premedication and was attributed to the epinephrine content of the anesthetic solution."

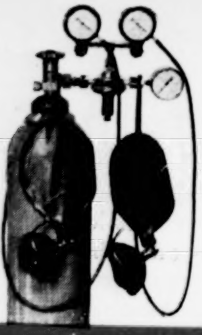
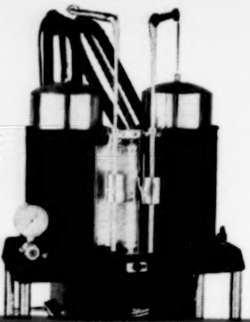
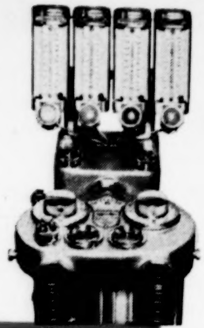
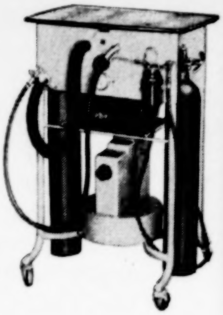
Esplen, J. R.: 'Differential pressure' respiration in thoracic operations. Brit. J. Anaesth. 23:214-218, Oct. 1951.

"If two rubber balloons, different in size but of equal thickness of wall, are attached to the two limbs of a 'Y' tube, it will be found that any attempt to inflate both balloons simultaneously will be defeated by the behaviour of the larger balloon, which always blows up in preference to the smaller one. Observations made in the course of a series of 200 resections for pulmonary tuberculosis (to be reported in detail later) suggest that the principle involved in this simple experiment may be utilized to provide a quiet surgical field during intrathoracic operations. Nitrous oxide-oxygen/thiopentone anesthesia in combination with relaxants was used in these cases, and artificial ventilation was maintained in the usual way by rhythmic compression of the breathing bag, up to the moment of pleural incision. The inflationary pressure was then reduced to range from 0 to between 5 and 7.5 cm. of water, until the lung on the operated side was seen to have undergone collapse; a process which was sometimes hastened by the deliberate application of pressure by the surgeon. Experience showed that there was little tendency for the contra-lateral lung to collapse during this interval provided that its pleural space was intact and that the degree of Trendelenburg tilt was not excessive. It was, however, customary to increase the respiratory rate at this stage in order to minimize the reduction in ventilation resulting from the tidal volume of 150-250 ml. produced by the reduced pressure. After the desired degree of collapse had been achieved, it was observed that it was often possible to raise the inflationary pressure slowly, to range from 0 to between 10 and 15 cm. of water, and so produce a tidal volume of from 250-500 ml. without re-inflating the lung on the operated side. As a result an unimpeded approach and a very quiet field could be provided throughout operation. Although this 'differential' effect could be obtained by manual inflation of the lungs, it was found to be more satisfactory to use a machine for the purpose. . . .

"The differential effect could not be properly demonstrated when multiple cavities or emphysematous changes were present in the lung on the operated side, nor when an artificial pneumothorax or extensive pathology was present on the contra-lateral side. On no occasion was any difficulty experienced in re-inflating the lung at the end of operation, and no postoperative complications have arisen on the operated side which could be attributed to the technique."

WYANT, G. M., AND SADOVE, M. S.: Anaesthesia in the U.S.A. Brit. J. Anaesth. 23:219-233, Oct. 1951.

"Since the inception of surgical anaesthesia, the English-speaking countries have been the pioneers of progress in this new field. Despite the constant exchange of ideas and the vast amount of literature on subjects related to anaesthesia, the specialty has developed among somewhat different lines in Britain and America. . . . This paper is presented in the hope that it may contribute something useful to anaesthesia in both countries by furthering the understanding of mutual problems. It must be emphasized at the outset that there is no such thing as 'American Anaesthesia', and that this paper can only deal with general trends; there may be marked variations from these trends in the various centres. . . . Nitrous oxide, ether, cyclopropane, vinyl ether, ethyl chloride, thiopentone, bromethol and the muscle relaxants occupy a position in the United States similiar to that which they hold in Britain. Ethylene, however, which is almost never found in Britain, is a great favourite in the Middle-Western States. . . . Trichlorethylene, on the other hand, so beloved in Britain, has never gained popularity in the United States. . . . If chloroform is rarely used in hospital-practice in England, it is hard even to find a bottle of the drug in the average American hospital. . . . Where cinchocaine is the long-acting spinal analgesic of choice in Britain, amethocaine (Decicaine, Pontocaine) is the favourite in the United States. . . . Carbon dioxide administration is rarely resorted to during anaesthesia. . . . Helium, which for a time enjoyed such popularity, is now being used much less frequently than before. . . . The exact status of intravenous procaine in anaesthesia must still evolve with the passage of time. . . . Inhalation anaesthesia is administered by the closed, semi-closed and open techniques very much in the way it is administered also in Britain. Intravenous anaesthesia with the ultra-short-acting barbiturates is administered in many centres by the continuous drip method, a technique less frequently encountered in Britain. . . . Continuous spinal analgesia is a very popular method in the U.S.-A., presumably because operations tend to last so much longer than do the same procedures in Britain. . . . Continuous caudal

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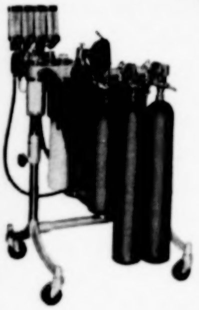

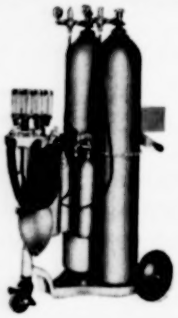

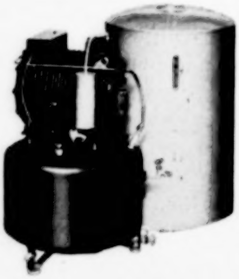

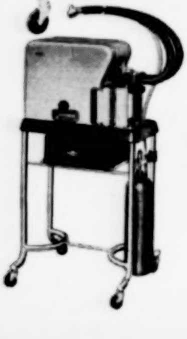
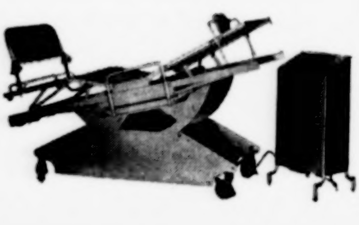

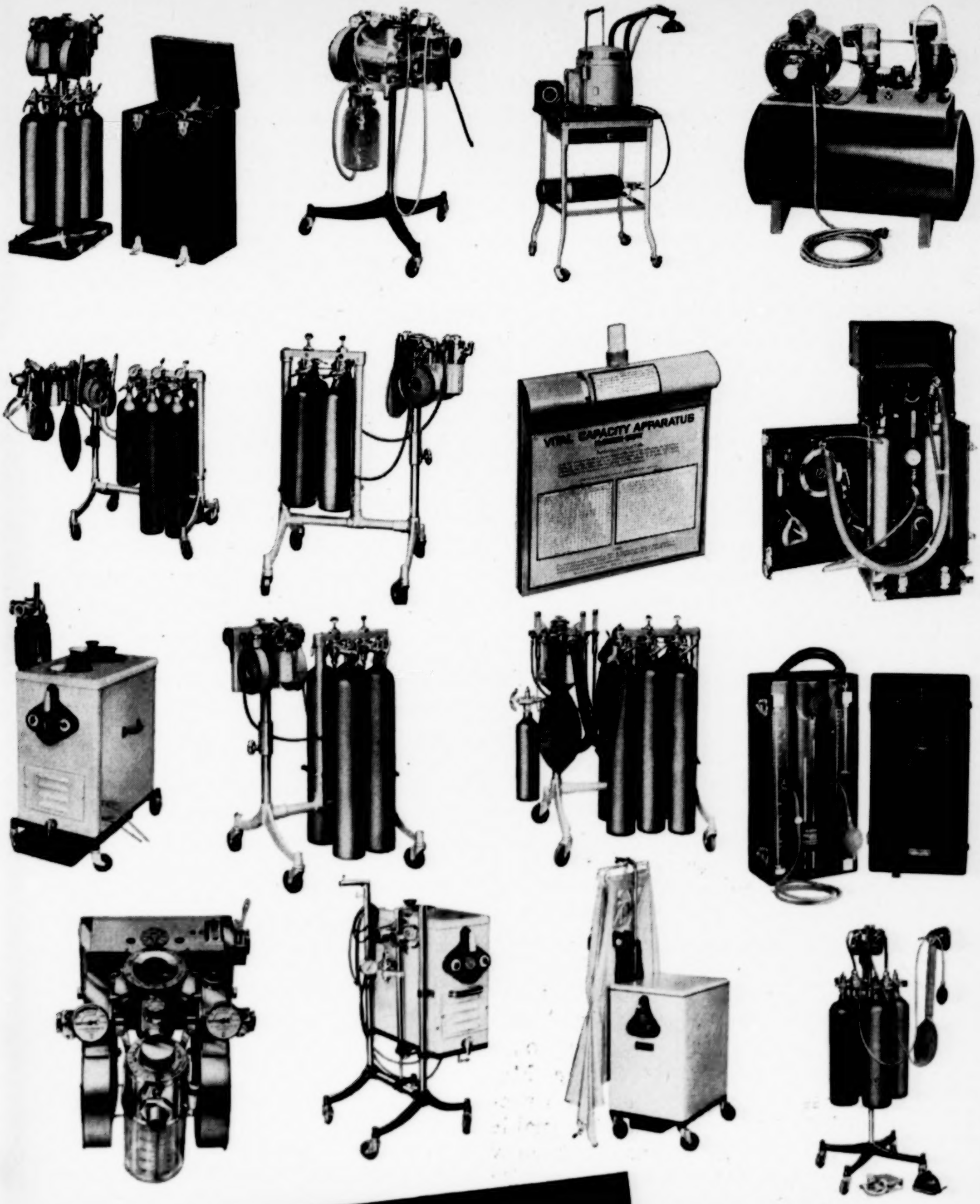

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analgesia is quite popular for obstetrical analgesia in many places, although there appears at present to be a trend away from this method in favour of subarachnoid saddle-block. . . . Obstetrical analgesia with nitrous oxide and air, comparable with that obtained by the Minnitt apparatus, is not practised in the United States; and no machine is available for that purpose. Trichlorethylene, too, is rarely resorted to. . . . Indications for tracheal intubation are considered similar to those in Britain, with blind nasal intubation being much less popular in the United States. . . . One of the striking features of anaesthesia in the United States is the tendency to use drugs in greater dilution than in Britain and to employ smaller doses initially. . . . Record-taking during anaesthesia is a universal feature of American anaesthesia. . . .

"The principal brands of American machines, the Heidbrink, Foregger, and McKesson are well known in Britain. . . . However, there is no carbon-dioxide two-phase circle absorber, similar to the Coxeter-Mushin unit, American circle-absorbers acting only on one phase of respiration. Machines in the States have no provision for non-interchangeable couplings, but plans have now been elaborated for a system by which cylinders can no longer be attached to the wrong yoke. . . . Laryngoscopes are of many types, the most popular ones being the Guedel, Flagg, and Wis-Foregger blades. The Mackintosh [sic] -laryngoscope is used by many, but is less commonly seen than in Britain. As for intravenous therapy equipment, the striking feature in the States is the use of disposable administration-sets. . . .

"Problems of undergraduate-training in anaesthesia in the States are very similar to those in Britain. The time allotted for teaching is totally inadequate and the student leaves his Medical School with very little practical experience and with only a sketchy theoretical background. . . . Postgraduate training and instruction, on the other hand, is excellent. . . . There are two main qualifications in anaesthesia in the United States. The F.A.C.A. (Fellow of the American College of Anesthesiologists) is awarded upon examination to those who do not yet hold the license of the American Board of Anesthesiology, but who have completed one year in an approved residency, or who have practiced anaesthesia for not less than five years. . . . The Diploma of the American Board of Anesthesiology is the ultimate goal of all anaesthetists. It requires graduation from an approved medical school and an approved interneship. A candidate must have limited his practice to anaesthesia as a specialty for five years of which at least two years must have been spent in formal approved training, and he must be a member in good standing of an approved national, state, or local society. The diploma is awarded after very thorough examination in three parts, namely written, oral, and practical, and the standard is very high indeed Holders of the diploma must limit their practice exclusively to an

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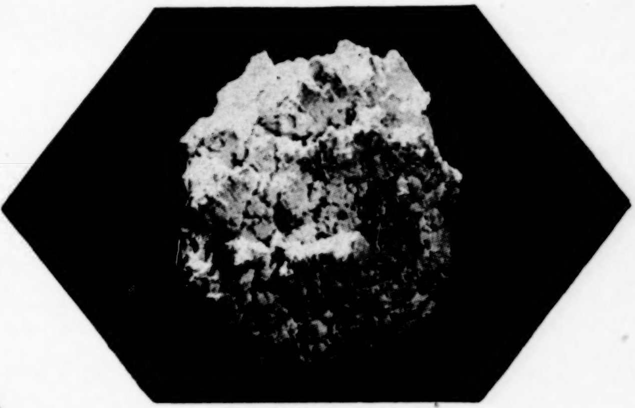
aesthesia. Apart from these, special qualifications are obtainable from some Universities, such as Master of Science (Anesthesia) and similar higher degrees. The International College of Anesthetists also awards a Fellowship, the F.I.C.A. . . .

"One of the most striking features of American anaesthesia, and also one of the most controversial ones, is the existence of nurse-technicians in many States of the Union. These nurses receive a course of training up to twelve months, but often this is much less or only amounts to a short term of apprenticeship with a more senior nurse. In many of the smaller hospitals (and in some of the larger ones too) no physician-anaesthetist is even on the hospital staff. These nurses work under the direct supervision of the surgeon who also bears the medico-legal responsibility for their work. In some places these nurse-technicians even carry out intubations, and in rare instances administer spinals. This situation has arisen because of the reluctance in years gone by for physicians to enter the field of anaesthesia; even today the demand for medically qualified anaesthetists much outstrips the supply. However, there is a gradual trend away from nurse-technicians ('Anesthetists') in favour of medical 'Anesthesiologists', and more and more surgeons have come to recognise the value of having a colleague at the head of the table and of thus being relieved of a heavy burden of responsibility; not to mention the better service obtained. But still there are many who will not part with nurse-technicians. This is a tricky problem, as yet only partially solved, and certainly the economic implications of medical anaesthesia play a very important role. However much one may deplore the intrusion of nurse-technicians into a field which should be the sole domain of medical practice, one cannot forget that the nurse with her empirical knowledge and with her practical experience in anaesthesia is probably the lesser of two evils when compared with the newly-qualified house-surgeon whose lowliest duty commonly in British hospital is to administer anaesthetics. It is probably the existence of nurse-anaesthesia in the States which has delayed for so much longer than in Britain the recognition of anaesthesia as a fully-fledged specialty. Today anaesthesia has achieved recognition in the larger sense of the word, although individual surgeons and some hospital-administrators continue in their refusal to accept this as a fact. . . .

"Except for some few places, the anaesthetic-orderly is non-existent in America. . . . Research in anaesthesia and related fields is very active indeed in the States. . . . There is a constant flow of new pharmaceutical preparations which require attention, and although many of them are ultimately discarded, some very useful drugs have emerged and are constantly emerging from these studies. . . . Postoperative recovery rooms are becoming very popular, and many of the better hospitals now have added these highly specialized units to their services. . . . American anaesthetists are much more explosion-conscious than their British col-



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leagues, probably because of the apparent greater frequency of such mishaps in the States."

KEATS, A. S.; D'ALESSANDRO, G. L., AND BEECHER, H. K.: A controlled study of pain relief by intravenous procaine. J.A.M.A. 147:1761-1763, Dec. 29, 1951:

"Since 1947, almost 50 publications have appeared which report that many varieties of pain as well as edema, muscle spasm, itching, symptoms of asthma, and certain eye diseases have been relieved by intravenous procaine. Most observers have reported that the side-actions are minimal and of little consequence. Despite the necessity of controls in investigations of this type, no observer (known to the authors) in studying the beneficial effects of this drug has treated a comparable group either with a placebo or with a standard therapeutic agent. Both kinds of comparison are essential. In addition, the known rapid hydrolysis of procaine in the blood stream and the slight or absent analgesic effects of its break-down products (para-aminobenzoic acid and diethylamino ethanol) are not in accord with the prolonged pain relief reported. For these reasons, a controlled study of pain relief by intravenous procaine was undertaken. . . . Saline, procaine, and morphine were given intravenously to the same 53 postoperative patients for treatment of pain. Saline relieved 20% of this group, procaine 40%, and morphine 70%. The degree of relief produced by procaine approximates that produced by 90 mg. of pentobarbital sodium. The analgesia produced by intravenous procaine was accompanied by frequent unpleasant and sometimes serious side-actions. Unless procaine, administered by this route, can be demonstrated to produce significant beneficial effects on specific disease-processes, it has no place in the treatment of pain."

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Book Reviews

Grouping, Typing and Banking of Blood. By Otakar Jaroslav Pollak, M.D., Ph.D., F.A.C.P., Director, Blood Bank; Chief, Departments of Anatomical, Clinical and Experimental Pathology; Director, School for Medical Technologists, Quincy City Hospital, Quincy, Mass.; Consultant Pathologist, Jordan Hospital, Plymouth, Mass. Cloth. 163 pages, 25 illustrations. Springfield, Ill.: Charles C Thomas, Publisher, 1951. $5.75.

Although this book was written for blood bank personnel, it will be of value to the anesthetist who is often involved in the administration of blood transfusions. The complex and sometimes confusing facts about blood for transfusion are presented in clear and relatively brief fashion. Ten detachable charts suitable for pasting on the walls of blood bank rooms are included.

The Mode of Action of Anaesthetics. By T. A. B. Harris, M.B., B.S., D.A., F.F.A.R.C.S, Anaesthetist to Guy's Hospital and to St Peter's Hospital for Stone. Cloth. 768 pages, 22 illustrations. Baltimore: Williams & Wilkins Co., 1951. $8.00.

The material in this book is based on a series of lectures and presents the mode of action of anesthetics as an integrated story. The book is divided into four parts: (1) "Narcotics," (2) "Anaesthetics," (3) "The Co-relation of the Level of Anaesthetic Depression of the Nervous System with Anaesthetic Sleep; Loss of Sensation and Loss of Muscle Movement and Muscle Tone," (4) "Metabolism during Anaesthesia." In the last part more than 200 pages are devoted to the side actions of anesthetics. In the preface the author has precluded comment on some of his conclusions by stating, "Perhaps the writer has been too ready to accept logical probabilities based on accepted facts in order to complete the story. This is deliberate and is done with the object of stimulating interest and research."

Surgical Care: A Practical Physiologic Guide. By Robert Elman, M.D., F.A.C.S., Professor of Clinical Surgery, Washington University School of Medicine; Assistant Surgeon, Barnes Hospital; Associate Surgeon, St. Louis Children's Hospital; Director of Surgical Service, H. G. Phillips Hospital, St. Louis, Missouri. Cloth. 586 pages, illustrated. New York: Appleton-Century-Crofts, Inc., 1951.

This book will be of interest to the anesthetist who, like the surgeon, is interested in the patient not only during the immediate operative period but also during the preoperative and postoperative periods as well. Time spent on study of the entire content will not be wasted. A 59 page chapter on anesthesia (chapter 7) has been written by Meyer Saklad, M.D.

Modern Practice in Anaesthesia. By Frankis T. Evans, M.B., B.S., F.F.A.R.C.S., D.A., Honorary Anaesthetist, St. Bartholomew's Hospital, London. Cloth. 606 pages, 228 illustrations. New York: Paul B Hoeber, Inc., 1949.

Twenty-four contributors have written various chapters of this book. Where differences of opinion have been expressed, the author has made no attempt to compromise them but leaves the reader free to evaluate the various points of view.

A wide variety of subjects is presented, not only by anesthetists but by a cardiologist, a pathologist, an anatomist, and others.

ANESTHESIA IN GENERAL PRACTICE. By Stuart C. Cullen, M.D., Head of Division of Anesthesiology, Department of Surgery, State University of Iowa Hospitals; Professor of Surgery (Anesthesiology), State University of Iowa College of Medicine. Ed. 3. Cloth. 292 pages, 36 illustrations. Chicago: Year Book Publishers, Inc., 1951.

The first edition of this book was published in 1946. In this edition as in the first and second editions the author has adhered to the original principle that anesthetic problems "must be solved according to an understanding of the basic factors involved."

A chapter on the use of depressant drugs has replaced the chapter in previous editions on preanesthetic medication. This permits a broader presentation of the use of these drugs not only before but during and after operation. Some of the newer relaxants, newer concepts in the use of pentothal sodium, and the use of procaine and alcohol intravenously are additions to this edition.

THE PHARMACOLOGIC PRINCIPLES OF MEDICAL PRACTICE. By John C. Krantz, Jr., Professor of Pharmacology, School of Medicine, University of Maryland; Secretary of the General Committee of Revision of the United States Pharmacopeia 1940-50, and C. Jelleff Carr, Associate Professor of Pharmacology, School of Medicine, University of Maryland; Auxiliary Member of the Revision Committee of the United States Pharmacopeia 1940-50. Ed. 2. Cloth. 1116 pages, 95 illustrations. Baltimore: Williams & Wilkins Co., 1951.

In the second edition, published only two years after the appearance of the first edition, the authors have revised most of the chapters of this valuable book. New material has been added. The rapid advancements in pharmacology make an up-to-date volume essential. For reference and for teaching this book is a "must" for anesthetists.

A MANUAL OF SIMPLE NURSING PROCEDURES. By Mary J. Leake, R.N., Director, Public Health Nursing Association, Richmond, Indiana; Formerly Senior Assistant Nurse Officer (R), U.S. Public Health Service. Paper. 65 pages, illustrated. Philadelphia: W. B. Saunders Co., 1951.

This manual is designed for teaching nursing assistants simple procedures in the care of patients. It will be useful to anesthetists who may have nursing assistants, not only for its content but for the step-by-step method of outlining duties for the assistant.

The fifteenth qualifying examination for membership in the American Association of Nurse Anesthetists will be conducted on Saturday, May 10, 1952.

The deadline for completed applications, including transcripts, is April 4. If application with transcript is received too close to the deadline, the application may not be processed in time for the candidate to be scheduled for this examination. The decision of the Credentials Committee will not be mailed to any candidate before April 6.

Applications and other correspondence should be addressed to the A.A.N.A. Executive Office, 116 S. Michigan Ave., Chicago 3, Ill.

Classified Advertisements

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ANESTHETIST: For 130 bed hospital near St. Louis. Salary $300 to $350 and full maintenance, based on experience. Apply: Administrator, Alton Memorial Hospital, Alton, Ill.

WANTED IMMEDIATELY: NURSE ANESTHETISTS for 700 bed general hospital. Pleasant working conditions. Salary open. Complete maintenance. Liberal employee benefits. Apply: Personnel Director, Grady Memorial Hospital, 36 Butler St., S. E., Atlanta, Ga.

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WANTED: Nurse anesthetist to work for physician anesthetist in city of 75,000 in South, Missouri. Salary $5,000. Apply: Box D-40, Journal A.A.N.A., 116 S. Michigan Ave. Chicago 3, Ill.

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NURSE ANESTHETIST: 300 bed hospital. Opening for a nurse anesthetist. Write direct to the Personnel Director, Providence Hospital, Washington 3, D.C.

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TWO ANESTHETISTS: For two hospitals: one 85 beds; the other 55 beds. Salary open. Maintenance. Mayme Risse, R.N., St. Luke's Hospital, Fergus Falls, Minn.

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NURSE ANESTHETISTS: General 188 bed hospital, no obstetrics, excellent personnel policies. Starting salary $350. Maintenance optional. Apply: Superintendent, Trinity Hospital, Minot, N. Dak.

WANTED: Experienced nurse anesthetist for 32 bed hospital. Salary $375. No O.B. calls. Write for particulars. Wallowa Memorial Hospital, Enterprise, Ore.

TWO NURSE ANESTHETISTS: For 125 bed general hospital. Salary open. Full maintenance. Apply to: Superintendent, Maine Eye and Ear Infirmary, Portland, Maine.

ANESTHETISTS WANTED: Busy suburban hospital near Chicago. New nurses residence. (Apartments available for married anesthetists.) Starting salary $300 per month and complete maintenance which is equivalent to $400. Vacation, sick leave, Blue Cross Insurance, and free life insurance. Apply: Box C-20, Journal A.A.N.A., 116 S. Michigan Ave., Chicago 3, Ill.

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TWO ANESTHETISTS: For 162 bed general hospital. One hour from Pittsburgh. Four anesthetists employed. Minimum night call. Salary depends on experience. Minimum $300 monthly with maintenance, sick leave, holiday time, month vacation, etc. Apply: Administrator, Charleroi-Monessen Hospital, North Charleroi, Pa.

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WANTED: Second anesthetist for 200 bed hospital, 40 miles east of Pittsburgh. Surgery under supervision of board qualified surgeons. Good salary. Pleasant working conditions. For particulars, write: Administrator, Latrobe Hospital, Latrobe, Pa.

ANESTHETIST: For 340 bed hospital. Starting salary $330 with complete maintenance. Periodic increases, six holidays, annual vacation with pay, sick leave and hospitalization provided. Apply: Clarene Carmichael, R.N., B.S., Director of Anesthesia, Norfolk General Hospital, Norfolk 7, Va.

IMMEDIATE OPENINGS AVAILABLE: A.A.N.A. members, two nurse anesthetists needed. Obstetric anesthesia in a very active department with 350 to 400 deliveries monthly. Eight hour rotating shifts: $350 a month beginning salary with room and laundry; 50% of anesthesia fee per case for second call. Social Security, and very pleasant working conditions. Apply: Administrator, Good Samaritan Hospital, Dayton, Ohio.

WANTED NURSE ANESTHETIST: 74 bed modern general hospital, fully approved, located in city of 12,000 in foothills of Blue Ridge Mountains. Salary $350.00 per month; meals and laundry of uniforms furnished. Apply to: Administrator, Radford Community Hospital, Radford, Va.

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WANTED: Nurse anesthetist. 200 bed general hospital. Salary open. Apply to: Superintendent, Holy Rosary Hospital, Miles City, Mont.

WANTED: Nurse anesthetist. 115 bed modern hospital located forty-five minutes from Chicago loop via Illinois Central Railroad. Can furnish excellent living quarters. Two anesthetists; five day surgery schedule. Minimal obstetric call. Salary open. Apply: Ingalls Memorial Hospital, 155th St. and Page Ave., Harvey, Ill.

WANTED: Nurse anesthetist, modern 200 bed general hospital. Excellent nurses home. Located within approximately thirty minutes' drive from Virginia Beach and Ocean View. Excellent summer resorts. Salary $285 per month, meals and laundry, full maintenance, sick leave, and vacation. Address: Administrator, King's Daughters' Hospital, Portsmouth, Va.

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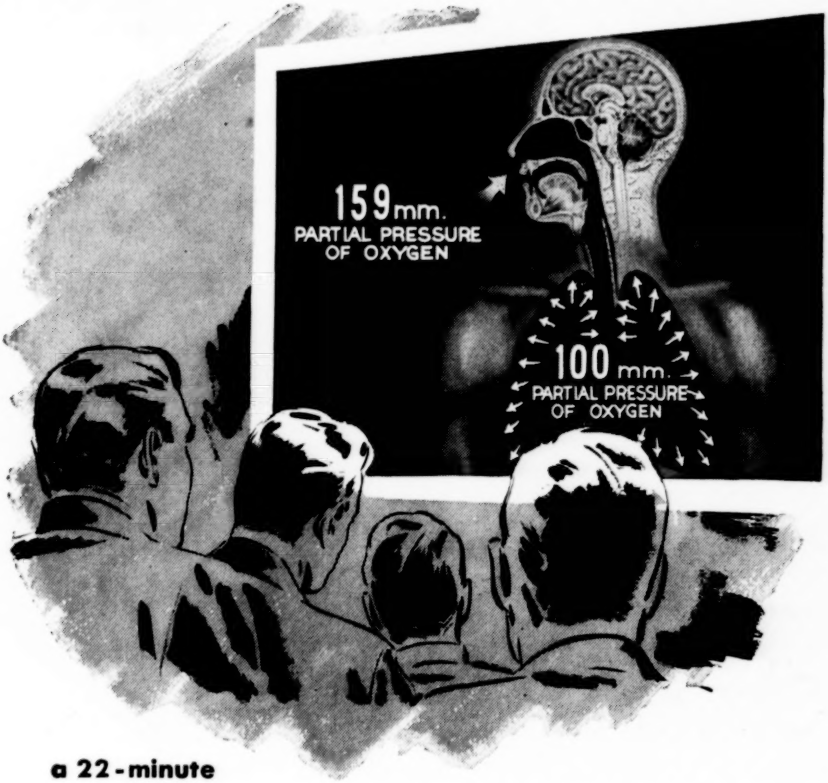

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